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AN AQUATIC RESOURCE SURVEY OF VICTORIA AND KING WILLIAM ISLANDS AND THE NORTHEASTERN DISTRICT OF KEEWATIN NORTHWEST TERRITORIES

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AN AQUATIC RESOURCE SURVEY OF VICTORIA AND KING WILLIAM ISLANDS AND THE NORTHEASTERN DISTRICT OF KEEWATIN NORTHWEST TERRITORIES

by

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TABLE OF CONTENTS

Page

LIST OF FIGURES, TABLES AND PLATES iii

INTRODUCTION 1

MATERIALS AND METHODS 3

RESULTS 7

Victoria Island
    General description 7
    Domestic, commercial, and sport fishing 10
    Previous aquatic research 17
    Survey results and discussion 18

King William Island and Adelaide Peninsula
    General description 29
    Domestic, commercial, and sport fishing 30
    Previous aquatic research 36
    Survey results and discussion 36

Boothia Peninsula and northeastern Keewatin
    General description 43
    Domestic, commercial, and sport fishing 46
    Previous aquatic research 50
    Survey results and discussion 51

SUMMARY 62

ACKNOWLEDGEMENTS 64

REFERENCES 65

PERSONAL COMMUNICATIONS 75

APPENDIX I Marine Fish Species Distributions 77

APPENDIX II Freshwater Fish Species Distributions 83

APPENDIX III Fish Data 95
    Explanation of Tables 17 to 19 96
    Victoria Island fish data 98
    King William Island fish data 105
    Northeastern Keewatin fish data 108
    Fish diet summary 112
    Fish parasite distributions 115

Page

APPENDIX IV Geographic Distributions 119
Crustacean zooplankton. 120
Mollusca. 121
Miscellaneous invertebrates 122

APPENDIX V Previous Northern Land Use Information Series Reports 123

LIST OF FIGURES, TABLES AND PLATES

Page

INTRODUCTION

Plate 1 Inuit commercial fishermen vi
Plate 2 Southwestern Victoria Island vi
Figure 1 Study area 1
Figure 2 Physiographic subdivisions in the study area . . . 2
Figure 3 Study area topography 2

MATERIALS AND METHODS

Plate 3 Otolith removal for fish age determinations . . . 4
Plate 4 Fish parasite *Philonema agubernaculum* 4

VICTORIA ISLAND

Figure 4 Domestic fishing areas 11
Figure 5 Commercial and sport fishing areas 12
Plate 5 Fish processing plant in Cambridge Bay 13
Plate 6 Weir for monitoring fish populations 13
Table 1 Cambridge Bay commercial fishing production for 1982 15
Table 2 Water chemistry data 19
Table 3 Zooplankton species and abundance 19
Figure 6 Sampling locations 20
Table 4 Age, length, and weight summary for Arctic charr, lake trout, and least cisco 24
Table 5 Sexual maturity summary for Arctic charr, lake trout and least cisco 25
Figure 7 Histogram of age-frequency distribution by length class for an Arctic charr population . . . 26

KING WILLIAM ISLAND

Figure 8 Domestic fishing areas 31
Figure 9 Sampling locations and commercial fishing areas 33
Table 6 Gjoa Haven commercial fishing production for 1982 34
Plate 7 Commercial fishing camp on the Hayes River 35
Plate 8 Inuit fisherman removing livers from burbot caught in the Hayes River 35
Table 7 Water chemistry data 37
Table 8 Zooplankton species and abundance 37
Table 9 Age, length, and weight summary for Arctic charr and least cisco 39
Table 10 Sexual maturity summary for Arctic charr and least cisco 39

KING WILLIAM ISLAND (cont'd) Page

Figure 10 Histograms of age-frequency distributions by length class for populations of Arctic charr and least cisco 40

NORTHEASTERN KEEWATIN

Figure 11 Domestic fishing areas. 45
Figure 12 Sampling locations and commercial fishing areas 48
Table 11 Pelly Bay and Spence Bay commercial fishing production for 1982 49
Table 12 Water chemistry data. 52
Table 13 Zooplankton species and abundance 52
Table 14 Age, length, and weight summary for Arctic charr, lake trout, lake whitefish, Arctic cisco, fourhorn sculpin, and shorthorn sculpin 54
Table 15 Sexual maturity summary for Arctic charr, lake trout, lake whitefish, Arctic cisco, fourhorn sculpin, and shorthorn sculpin 55
Figure 13 Histograms of age-frequency distribution by length class for Arctic cisco and Arctic charr caught in the Hayes River. 57
Figure 14 Histograms of age-frequency distributions by length class for lake whitefish and lake trout caught in the Hayes River 59

APPENDIX I

Table 16 Distribution records of marine fish species caught in or near the survey area 79
Figure 15 Marine fish species catch locations 81

APPENDIX II

Figure 16 Sites sampled during 1982 survey. 86
Figure 17 Arctic charr distribution 86
Figure 18 Lake trout distribution 87
Figure 19 Lake cisco distribution 87
Figure 20 Arctic cisco distribution 88
Figure 21 Lake whitefish distribution 88
Figure 22 Broad whitefish distribution 89
Figure 23 Least cisco distribution 89
Figure 24 Round whitefish distribution 90
Figure 25 Arctic grayling distribution 90
Figure 26 Northern pike distribution 91
Figure 27 Longnose sucker distribution 91
Figure 28 Ninespine stickleback distribution 92
Figure 29 Burbot distribution 92
Figure 30 Slimy sculpin distribution 93
Figure 31 Fourhorn sculpin distribution 93

APPENDIX III Page
Table 17 Data for fish from southern Victoria Island 98
Table 18 Data for fish from King William Island 105
Table 19 Data for fish from northeastern District of Keewatin and adjacent coastal marine waters 108
Table 20 Fish diet summary 112
Table 21 Metazoan fish parasite species distribution 115

APPENDIX IV
Table 22 Crustacean zooplankton species distributions 120
Table 23 Mollusc species distributions 121
Table 24 Miscellaneous invertebrate species distributions 122

Plate 1. Fishermen from Gjoa Haven cleaning fish during a test fishery of the Hayes River (66°09'N, 95°04'W), in early September 1982.

Plate 2. Southwestern Victoria Island has poorly developed drainage patterns, sparse vegetation, and snow patches year-round. This photo was taken at 69°45'N and 111°42'W, looking northwest towards Prince Albert Sound.

PREFACE

The Northern Land Use Information Series (NLUIS) is an on-going environmental research and information mapping program for northern Canada, which provides a convenient reconnaissance-level information base to facilitate regional planning and the application of the Territorial Land Use Regulations. This map series is jointly funded by the Department of Indian and Northern Affairs, and the Department of the Environment. Since 1971, 307 maps covering almost 3 million km^2 have been published for the Yukon Territory, most of the mainland Northwest Territories and a substantial portion of the Arctic Islands. Information presented in map and text form includes a wide range of environmental-social topics such as wildlife information, fish resources, an ecological land classification, native land use data, historical sites, proposed resource development activities, areas of conservation interest, and other information to assist in land use planning and management. The program relies on the cooperation and assistance of several federal and territorial government departments private research groups and local residents of the Yukon and Northwest Territories. Major participants include the federal Department of Fisheries and Oceans which provides the information on fish resources, the Northwest Territories Wildlife Service which is reponsible for the terrestrial wildlife data, and the Lands Directorate of Environment Canada which produces the ecological land classification information, co-ordinates the socio-economic and cultural data collection, and is responsible for the overall production of the maps and texts.

In addition to the published maps, several reports such as this, have been prepared which are based on the background research used in the preparation of the maps. A list of these reports is included in the Appendix.

(The views expressed in this report are those of the authors and do not necessarily reflect those of Environment Canada or the Department of Indian and Northern Affairs).

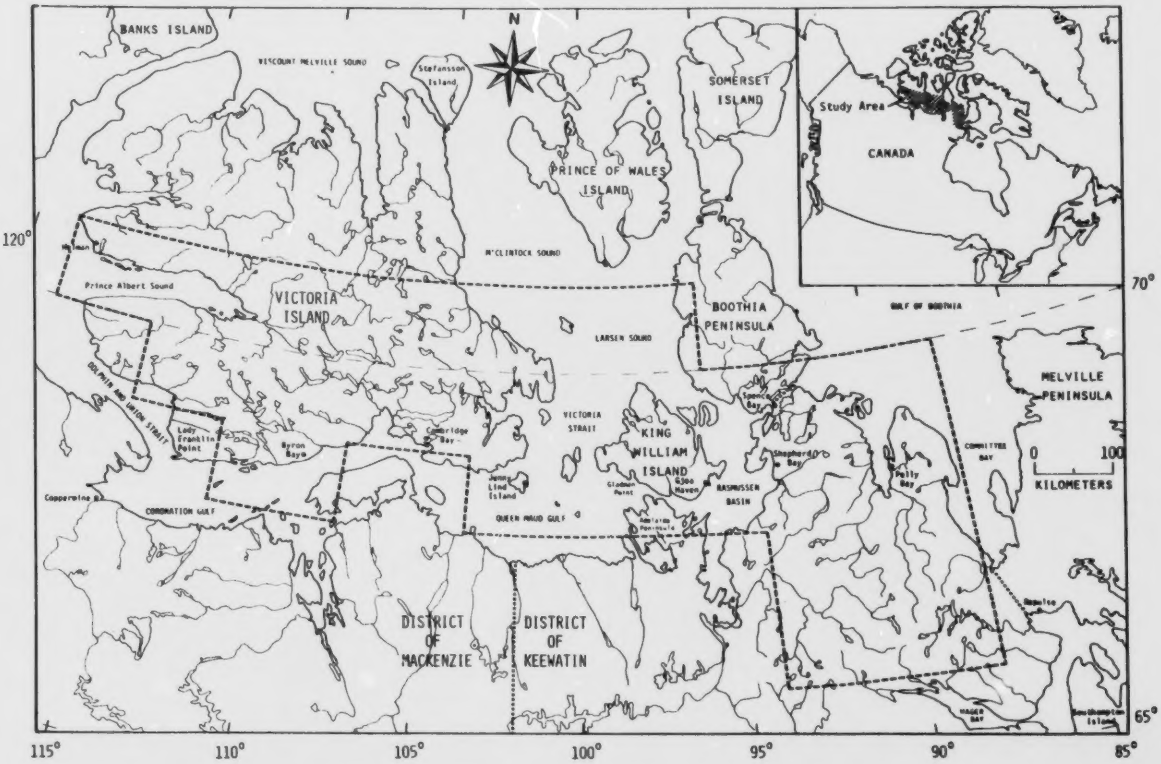
G.G. McLean
Program Coordinator
Land Use Information Series
February, 1984

INTRODUCTION

This report documents the results of fisheries survey work conducted in the summer of 1982 for the Northern Land Use Information Series (NLUIS) mapping program. The survey encompassed King William Island and the southern portions of Victoria Island and Boothia Peninsula, District of Franklin, and part of the northeastern District of Keewatin, Northwest Territories (Fig. 1, 2, and 3). These areas border Coronation Gulf, which is part of the Northwest Passage and a potential transportion route for Arctic resources, and they include several proposed gas pipeline routes.

Fish are a vital resource for residents of communities situated in the survey area. Residents of Holman, Cambridge Bay, Gjoa Haven, Spence Bay and Pelly Bay depend on fishing for food and employment (Plate 1). Indeed, the largest commercial Arctic charr *(Salvelinus alpinus)* fishery in the Northwest Territories is located at Cambridge Bay.

This report provides detailed information on the biology and utilization of fish species inhabiting the study area. It supplements comments included on 1:250,000 scale maps in the Northern Land Use Information Series and is one of a series of reports detailing fisheries survey work throughout the Northwest Territories (Appendix V).



BANKS ISLAND
N
VISCOUNT MELVILLE SOUND
Stefansson Island
SOMERSET ISLAND
Study Area
CANADA
PRINCE OF WALES ISLAND
120°
M'CLINTOCK SOUND
70°
Holman
Prince Albert Sound
VICTORIA ISLAND
BOOTHIA PENINSULA
GULF OF BOOTHIA
LARSEN SOUND
MELVILLE PENINSULA
DOLPHIN AND UNION STRAIT
Spence Bay
VICTORIA STRAIT
KING WILLIAM ISLAND
Lady Franklin Point
Byron Bay
Cambridge Bay
Shepherd Bay
COMMITTEE BAY
0
100
KILOMETERS
Pelly Bay
Jenny Lind Island
Gladman Point
Gjoa Haven
RASMUSSEN BASIN
Coppermine
CORONATION GULF
QUEEN MAUD GULF
Adelaide Peninsula
Repulse
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
65°
115°
110°
105°
100°
95°
90°
85°

Figure 1. Area surveyed during the 1982 Northern Land Use Information Series (NLUIS) mapping program.

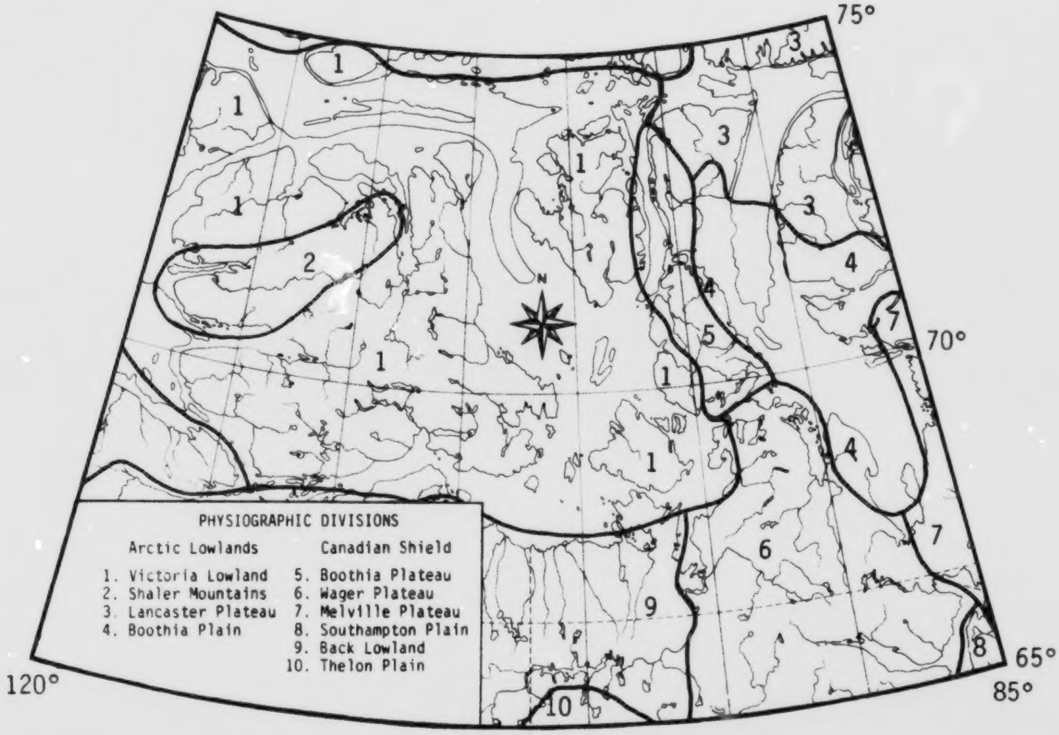

75°
70°
65°
85°
120°
N
1
2
3
4
5
6
7
8
9
10
PHYSIOGRAPHIC DIVISIONS
Arctic Lowlands
1. Victoria Lowland
2. Shaler Mountains
3. Lancaster Plateau
4. Boothia Plain
Canadian Shield
5. Boothia Plateau
6. Wager Plateau
7. Melville Plateau
8. Southampton Plain
9. Back Lowland
10. Thelon Plain

Figure 2. Physiographic subdivisions in the 1982 study area (after Bostock 1972).

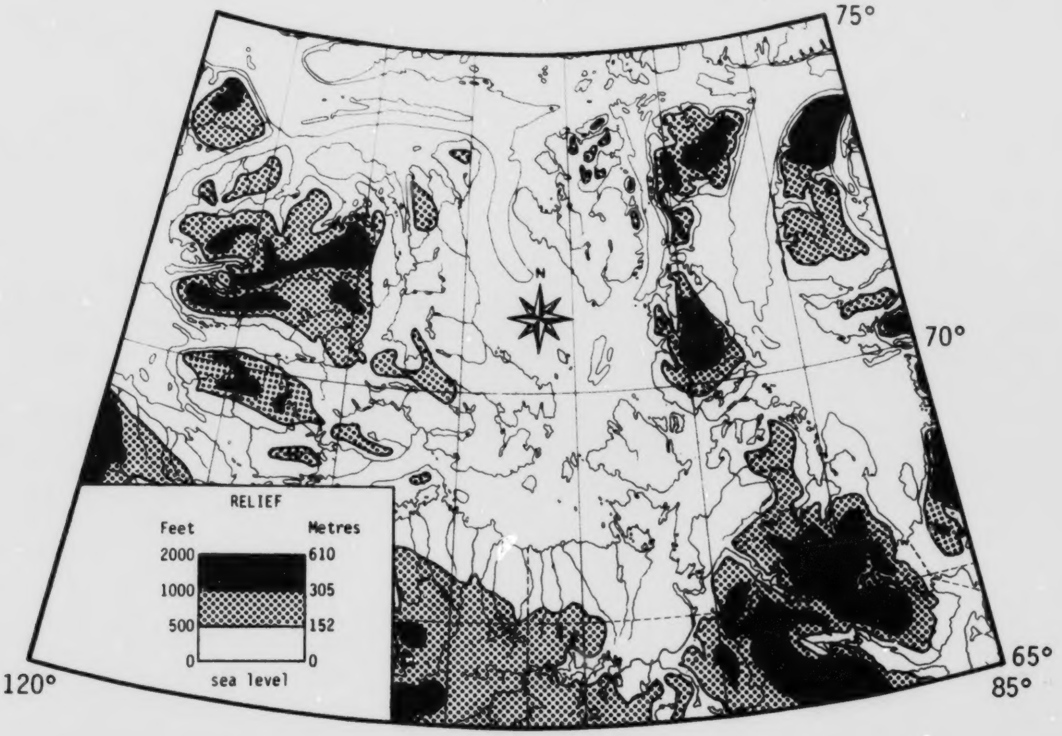

75°
70°
65°
85°
120°
N
RELIEF
Feet
Metres
2000
610
1000
305
500
152
0
0
sea level

Figure 3. Topography of the 1982 study area (after National Atlas of Canada 1974).

MATERIALS AND METHODS

Fish and related biota were collected between 3 August and 10 September, 1982 from fresh and coastal marine waters within the survey area (Fig. 1). Sites were reached using a float-equipped Bell 206 L Long Ranger helicopter. Freshwater and marine fishes, zooplankton, phytoplankton and surface water samples were collected. Fishes were weighed and measured; their stomach contents and parasite loads were examined; and bone strontium content, age, sex, and maturity were determined. Zooplankters were identified and counted; phytoplankters were identified; and, total dissolved solid, nutrient, and ion concentrations and pH and conductivity were measured in samples of surface water.

Fish were caught using gillnets, hoopnets, and minnow traps. Gillnets were Lundgren's green multifilament nylon survey type, 1.8 m deep and 60 m long, consisting of six 10 m panels of 10, 19, 33, 45, 55, and 60 mm mesh sizes (bar measure). Nets were generally set offshore on the bottoms of lakes, large rivers and the ocean. Streams were sampled by setting two hoopnets across the channel. The upstream hoopnet caught fish moving downstream and vice versa. The hoops, 61 cm in diameter with 3.7 m wings, were covered by #35 delta nylon with meshes 3.2 mm square. Fry were caught in the shallows using Gee' minnow traps. The traps were cylindrical, 44 cm long and 22 cm in diameter, with galvanized wire meshes 6.2 mm square. Mouth openings, 2 cm in diameter, were located at each of the inverted conical ends.

In the field, fish were weighed (Accu-Weight spring scales, round weight 0 to 30 ± 0.5 g; 30 to 2 000 ± 10 g; 2 000 to 10 000 ± 50 g), fork length (mm) was measured, and otoliths or scales were removed and stored in coin envelopes (Plate 3). Stomach contents were examined and a subsample of stomachs was frozen for laboratory identification of the contents. Sexual maturity was determined through gonad examination and the skin, mouth, gills, digestive tract, body cavity and swimbladder were examined for parasites (Plate 4). A subsample of fish were frozen for laboratory parasite examination. Representative preserved fish specimens were sent to the National Museum of Natural Science (N.M.N.S.), in Ottawa.

Otoliths were used to age Arctic charr, lake trout *(Salvelinus namaycush)* and burbot *(Lota lota)*, following the technique of Grainger (1953) Arctic cisco *(Coregonus autumnalis)*, least cisco *(C. sardinella)*, and lake whitefish *(C. clupeaformis)*, were aged from scales, using a Leitz Trichinoscope (Model IX-Q).

Food items in stomachs were identified to at least order and stomachs were assigned fractional fullness values ranging from 0 (empty) to 1 (full) based on their apparent capacity and contents. A modification of Hynes' (1950) point method was used to assess the importance of food items consumed. Each food item was assigned 1, 2, 4, 8, or 16 points according to the volume of it present in the stomach, a full stomach, irrespective of the size of the fish, receiving a total of about 20 points.

Plate 3. Otoliths, shown here being removed from the inner ear of an Arctic charr, are used to determine the ages of Arctic charr, lake trout, and burbot. Calcium deposition on the otolith forms annual growth rings.

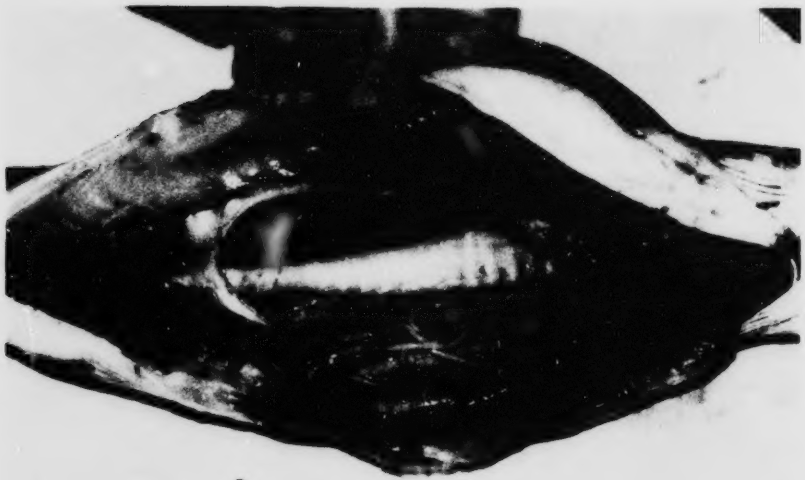


Plate 4. The worm-like structure in the body cavity of this lake trout is a parasitic nematode, *Philonema agubernaculum*, which infects both Arctic charr and lake trout.

Modification consisted of assigning <1 point to minor quantities of small items, rather than ignoring their contribution to the diet (Smart and Gee 1979). Representative samples of invertebrates that were eaten by fish or caught incidentally in the nets were sent to the N.M.N.S., Invertebrate Zoology Section.

Trematodes, cestodes, and acanthocephalans collected from fish in the field were relaxed in cold water, heat killed (except acanthocephalans) fixed in formyl acetic acid, stored in 70% ethanol, and then processed for identification in the laboratory according to standard parasitological procedures. Nematodes were killed in hot 70% ethanol, stored in 70% ethanol, and cleared in glycerine prior to identification. Parasitic copepods were fixed and stored in 70% ethanol. Parasite numbers were estimated in the field and preserved parasite samples were counted in the laboratory. In addition to the organs examined during the field autopsies, the heart, spleen, kidneys, liver, gallbladder, eyes, and musculature were examined for parasites.

Parasite species composition and strontium concentrations in fish bone are both indicators of lake-dwelling and searun lifestyles in fish (Behrens Yamada *et al.* 1979; Moreau and Barbeau 1979; Gaboury 1980; Dick and Belosevic 1981). To assess their use as a fish management aid for separating lake-dwelling and searun populations of Arctic charr, a subsample of otoliths from lake-dwelling and searun charr was assayed for strontium content. A 10 to 15 mg sample of otolith was dissolved in 1.0 ml of concentrated nitric acid, diluted to 10 ml, and analysed by Direct Current Plasma Emission Spectroscopy at 407.7 mm, using aqueous standards (Hunt pers. comm.). To prevent alkali metal enhancement, samples and standards were adjusted to 5 g·L^{-1} lithium, using lithium chloride buffer. Samples of lake water were also analysed at 407.7 mm but without LiCl buffering. They were compared to unbuffered standards. An in-depth discussion of the results will be published elsewhere.

Sexual maturity was assessed through gonad examinations and coded according to the following scale:

Male	Female	Development
1	7	immature
2	8	mature
3	9	near ripe
4	10	ripe
5	11	ripe and running
6	12	spent
0		sex indistinguishable

Zooplankton was collected in single vertical hauls using a 73 micron mesh Wisconsin net with a 25 cm mouth diameter. Specimens were preserved in 10% formalin and species abundances were determined by dividing the number of individuals caught by the volume of water strained. Specimens were identified by Dr. and Mrs. K. Patalas who retained the collection.

Phytoplankton was collected non-quantitatively, using a 10 micron mesh Wisconsin net with a 10 cm mouth diameter. Specimens were preserved in Lugols solution and were identified in the laboratory by Dr. G. Robinson. Time constraints did not permit their inclusion in this report.

Because monomictic Arctic lakes circulate completely in the summer, water samples taken near their surfaces are representative of the lake's chemistry as a whole (Schindler *et al.* 1974a, b; Welch pers. comm.). Water samples were collected in litre polyethylene bottles held below the surface. Particulate carbon, nitrogen, and phosphorous; calcium, magnesium, potassium, sodium, chloride, and sulphate; and chlorophyll A samples were handled and stored as per Stainton *et al.* (1977). Stainton's sample storage methods were not followed for dissolved nitrogen and phosphorous or for specific conductance. The nitrogen and phosphorous samples were filtered but did not undergo ultra violet combustion to break up the organics; specific conductance was measured on stored samples. These deviations in technique should not have seriously altered measurements because the samples were chemically dilute (Stainton pers. comm.). Laboratory pH measurements are reported and may differ slightly from actual lake values due to storage effects. Strontium excepted, all chemical analyses were performed by the Analytical Unit at the Freshwater Institute, Department of Fisheries and Oceans, Winnipeg. Secchi depth, secchi color, and surface water temperature (±0.1°C) were measured in the field.

RESULTS

VICTORIA ISLAND

General Description

Victoria Island, with a surface area of 216 000 km^2 is the second largest island in the Canadian Arctic Archipelago. It is situated south of Viscount Melville Sound and neighboured by Banks Island to the west, Prince of Wales and King William islands to the east, and the mainland to the south (Fig. 1). Stefansson Island, to the northeast is almost an extension of Victoria Island's Storkerson Peninsula.

Victoria Island is divided into two physiographic areas, the Shaler Mountain Belt and Victoria Lowland, both part of the Arctic Lowlands physiographic region (Bostock 1970, 1972; Fig. 2). The Shaler Mountain Belt is a region of plateaus and ridges, steep escarpments, linear valleys, buttes and cuestas. They are composed of Precambrian rocks, with summits typically 200 to 400 m above sea level (asl) and local elevations reaching 500 m asl (Fig. 3). Relief, particularly along the coasts, may change abruptly by over 200 m, and many of the large deep lakes in this region have precipitous outlet streams. Most of the rivers and streams are seasonal, although the Kuujjua River may flow year-round. The remainder of Victoria Island consists of monotonous lowlands, underlain by Palaeozoic sedimentary rock and dotted with numerous lakes (Plate 2). Much of the lowland lies within 200 m of sea level and the highest ground is about 300 m asl. Local relief ranges from a few to over 60 m with glacial landforms predominating, resulting in irregular river courses and poor drainage (Dunbar and Greenway 1956; Thorsteinsson and Tozer 1962; Fyles 1963).

The Shaler Mountain Belt is comprised of some 3 000 m of sandstone, siltstone, shale, dolomite and gypsum, often overlain by up to 300 m of basaltic lava and conglomerate (Thorsteinsson and Tozer 1962, 1970; Fyles 1963; Douglas 1971, 1973; Campbell 1981). Both the sedimentary and volcanic rocks enclose numerous gabbro sills. Quartzite, which underlies the sedimentary and volcanic layers, is only apparent in a small area near the southwest end of Hadley Bay where it has been exposed by uplift. Palaeozoic dolomites, limestones, sandstones, and shales underlie the Victoria Lowland. Most of the area's surface is covered by unconsolidated glacial deposits.

Victoria Island was covered by the Laurentide Ice Sheet and there is evidence of an older, possibly early Wisconsin, glaciation (Fyles 1963). Drumlins, moraines, eskers, and raised marine beaches are all apparent when the country is viewed from the air. Together with radiocarbon dates of marine shells, found at elevations exceeding 80 m asl, they suggest that the last glaciers retreated in a southwesterly direction between 8 500 and 12 500 years ago (Fyles 1963; Prest *et al.* 1972; Prest 1973). Nearly all of the southeastern half of Victoria Island was once covered by ocean and since glaciation, the island has risen between 100 and 200 m asl, from northeast to southwest (Andrews 1972).

Climatic variation is greater on Victoria Island than on most other Arctic islands due in part to its large size, close proximity to the mainland barrens, and variable coastal ice conditions. Multi-year sea ice, prevalent in Viscount Melville Sound, reduces the maritime effect on Stefansson and northwestern Victoria islands, causing climate there to resemble that on Bathurst Island. There is a mean annual temperature range of 38 to 40°C, with mean daily temperatures near -33°C in January and near 5°C in July (Thompson 1967; Fletcher and Young 1976; Maxwell 1981). The mean daily temperature remains below 0°C from 22 August to 10 June. Precipitation in this area is 100 to 125 mm annually of which between 35 and 40% falls as rain. Southern and central Victoria Island have a climate very similar to the nearby mainland. This is due mainly to the close proximity of the two large land masses and to the relatively narrow and shallow channel separating island and mainland. This area has a greater mean annual temperature range than the rest of the island, 42 to 45°C, with mean daily temperatures near -34°C in January and reaching 10° in July. The mean daily temperature remains below 0°C from the end of August until about the second week in June. Precipitation in this area is 100 to 150 mm annually of which between 50 and 60% falls as rain. The west coast of the island has a moderate climate due to the maritime effect of open waters to the west. This is reflected in a smaller mean annual temperature range, 36°C, and mean daily temperatures above -30°C in January and near 8°C in July. Mean daily temperature remains below 0°C from the end of August until the last week in May. Precipitation is higher than elsewhere on the island, 125 to 175 mm, of which 45 to 55% occurs as rainfall.

Wind direction on the island varies with location and season but the mean wind speed is generally 10 to 15 $km \cdot h^{-1}$. The net annual radiation received at the surface of southwestern Victoria Island, 6.3×10^5 $J \cdot m^{-2}$ is nearly double that on Bathurst and Melville islands. Ice on Victoria Island's lakes and rivers begins breaking up in June, although some deep sheltered lakes in the Shaler Mountain Belt still had ice in mid-August. Freeze-up begins in late August and early September, but may not be complete in some areas until October (Allen 1971; Fletcher and Young 1976; Maxwell 1981; Dahlke pers. comm.).

Vegetation is more abundant and varied on Victoria Island than on the islands north of Viscount Melville Sound (Porsild 1957, 1964; Packer 1969; Porsild and Cody 1980; Peterson *et al.* 1981). Mountain avens *(Dryas integrifolia)* is the dominant plant species on the summits and slopes of upland barrens. Other important species are Arctic willows *(Salix arctica)*, saxifrages *(Saxifraga* spp.*)*, and sedges (F. Cypraceae). Lichens are common and are often the only vegetation on exposed uplands or bedrock outcrops. Moss cover is restricted to moist protected depressions. Patina vegetation is found in local depressions which are moist following snowmelt and dry progressively during the growing season. Dwarf willows *(Salix* sp.*)* dominate vegetation along stream banks and on intermediate and lower slopes where surface materials are diverse and soil moisture content is greater than in the uplands. Forbs, gramminoids, mosses and lichens are also present. Poorly drained lowlands, pond and lake shores, local depressions, and seepage slopes are dominated by sedges, grasses and mosses. These lowland areas are common on southern Victoria Island and are heavily used by wildlife.

During the survey, Peary caribou *(Rangifer tarandus pearyi)* and muskoxen *(Ovibos moschatus)* were the most evident mammal species. Mated pairs of whistling swan *(Cygnus columbianus)* were present on many shallow ponds and lakes on southern Victoria Island.

There has not been the interest in natural resource development on Victoria Island that there has been on Melville and Bathurst islands, with the consequent lack of environmental research. However, the recent proposal by Polar Gas to build a natural gas pipeline along the western side of Victoria Island has and will stimulate research on the environmental impacts of pipeline development (eg. Jacobson 1980; Peterson *et al.* 1981; William *et al.* 1981).

There are two communities on Victoria Island, Holman and Cambridge Bay, and three Distant Early Warning (D.E.W.) line sites (Fig. 1). There is also a D.E.W. line site on Jenny Lind Island. Holman, located on the west coast (70°43'N, 117°43'W), was established in 1940 when the Hudson's Bay Company moved its post there from Fort Collinson. In 1962, the company closed its post at Read Island and many of the Inuit families there moved north to Holman. The community now has a population of 358 persons and a thriving arts and crafts industry. Hunting, trapping, and fishing remain important to the livelihood of the residents. Cambridge Bay, on the south coast of Victoria Island (69°03'N, 105°05'W), has long been an important centre of activity, owing to the abundance of fish and game in the area. The Hudson's Bay Company established a post nearby in the early 1920's, but it was not until 1955 when the community became a major supply and transport centre for the D.E.W. line that the community began to grow in earnest. Employment opportunities attracted Inuit from outlying camps and nearby communities and today the population numbers 907 persons. The economy of Cambridge Bay is based on wage employment and commercial fishing (Farquharson 1976; Government of the Northwest Territories 1982). The Lady Franklin Point, Byron Bay, and Jenny Lind Island D.E.W. line sites were established in 1957. Personnel are normally stationed at the sites for periods of a year and families of Inuit employees sometimes live at or near the sites.

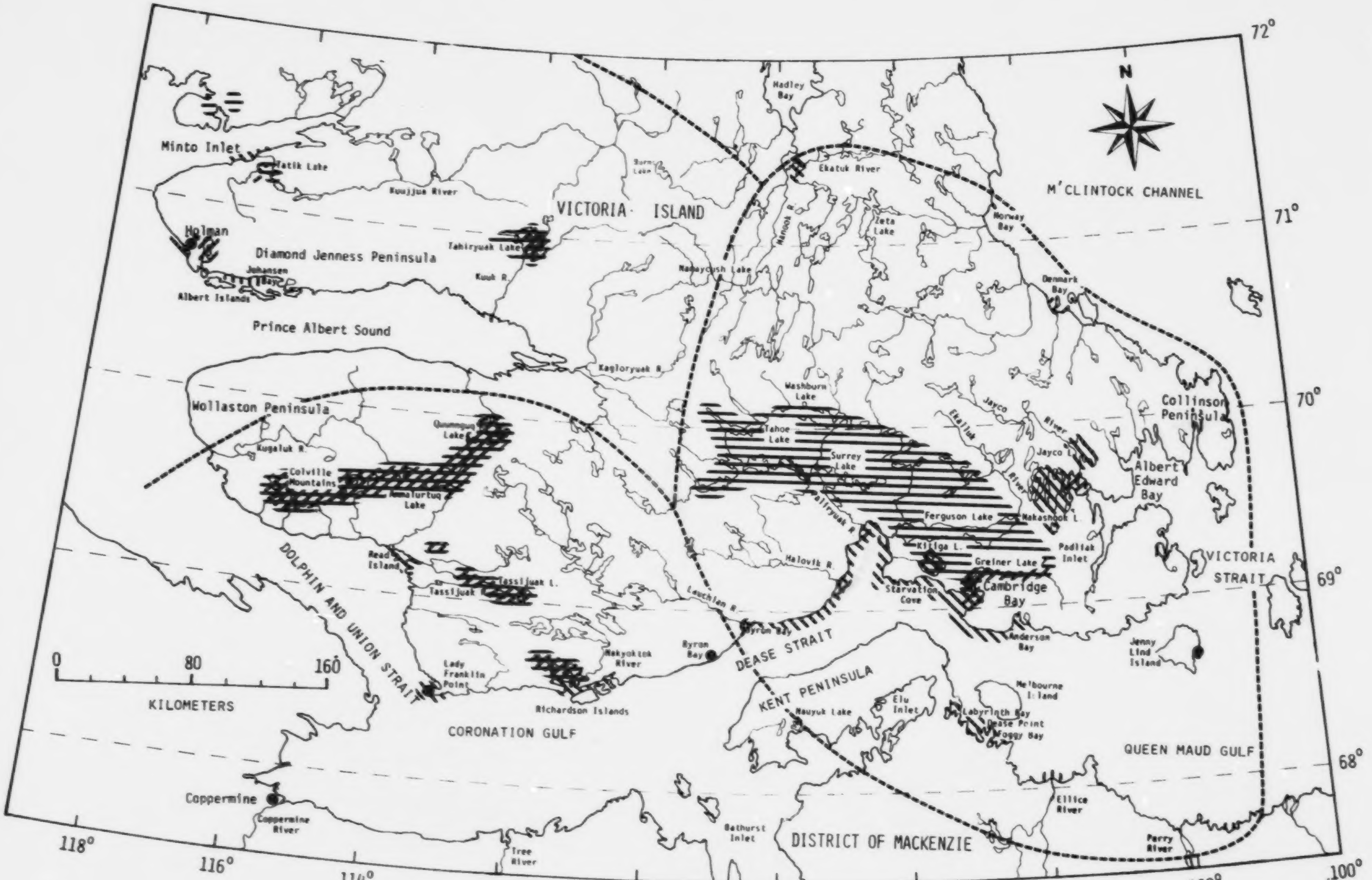
Domestic, Commercial, and Sport Fishing

Cambridge Bay

Fish, particularly anadromous (searun) Arctic charr, are an important food for residents of Cambridge Bay. Between March and December, fishermen from the community range as far south and east as Perry River (67°43'N, 103°10'W), west to Lauchlan River (68°56'N, 108°30'W), and north to Norway Bay (71°05'N, 104°33'W; Fig. 4). Travelling to the fishing areas by snowmobile, in spring and fall, or by boat in summer, they gillnet, jig, or angle Arctic charr, lake trout, least and Arctic cisco, lake whitefish, cod and sculpin.

Inuit residents of Cambridge Bay catch fish to feed themselves and their dogs. From March to June and October to December, these domestic fishermen net or jig fish from under the ice of freshwater lakes. Landlocked Arctic charr and lake trout are caught in Tahoe, Washburn, and Kitiga lakes and in many unnamed lakes north and east of the community; anadromous Arctic charr, lake trout, and least cisco are caught in Ferguson and Greiner lakes (Fig. 4). Arctic charr and cod are also jigged from under the ice of Cambridge and Edward Albert bays in April and May. During July and August, nets are set along the southern shore of Victoria Island, between Byron and Anderson bays, and along the Queen Maud Gulf coast in Labyrinth and Foggy bays. Anadromous Arctic charr, cod, and sculpin are the main species caught, but cod and sculpin are only eaten occasionally for a change of diet. In late June to early July and in late August to early September, anadromous Arctic charr are netted at river mouths as they migrate to and from the sea respectively. This domestic fishing activity is often concurrent with the commercial fishery which operates at the major rivers. Inuit residents of Cambridge Bay also angle Arctic charr and lake trout from Kitiga and Greiner lakes during July and August (Abrahamson 1964; Farquharson 1976; Carder, Kaomayok, Lyall, and Williams pers. comm.).

Since 1960, members of Cambridge Bay's Ikaluktutiak Co-operative have harvested and processed anadromous Arctic charr for commercial sale (Barlishen and Webber 1973; Kristofferson and Carder 1980; Plate 5). Most commercial fishing in the Cambridge Bay area takes place at river mouths, during the spring and fall charr migrations (Fig. 5). The catch quotas and time of fishing vary between locations. Fish are caught using gillnets except at Jayco River where an experimental weir is now being tested (Plate 6). They are gutted on site and then flown to the Co-operative's processing plant in Cambridge Bay where they are cleaned and frozen. The Co-operative sells about 10 000 kg (dressed weight) of fish within the community and markets the bulk of the catch in Edmonton, Alberta, through the Freshwater Fish Marketing Corporation (Kristofferson pers. comm.). Since 1977, the annual charr catch has varied between 45 000 and 65 000 kg (round weight) and the fishery has provided seasonal employment for between 30 and 40 persons annually, making it the largest Arctic charr commercial fishery in the Northwest Territories (Carder pers. comm.).


72°
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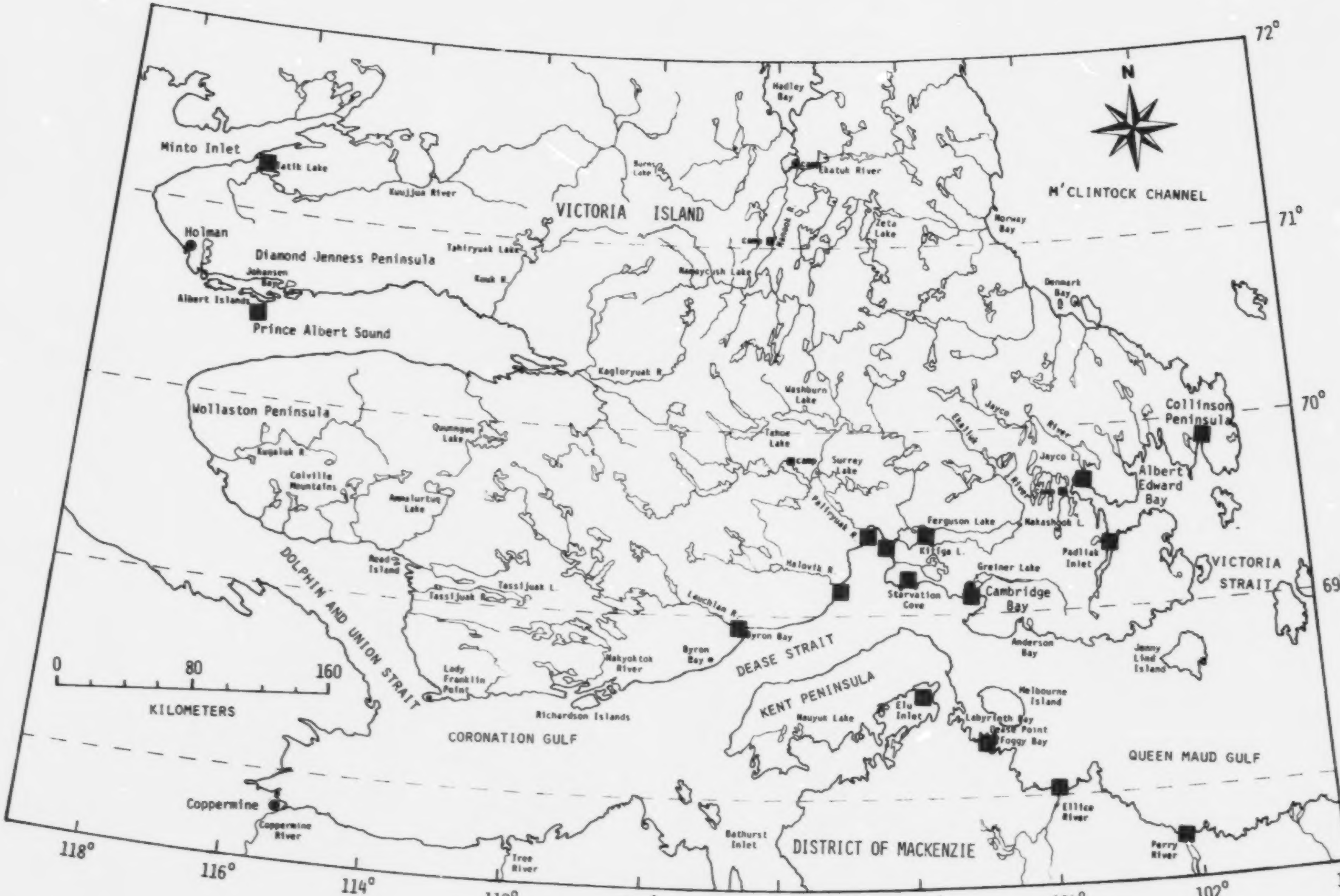
69°
68°
118°
116°
114°
112°
110°
108°
106°
104°
102°
100°
N
M'CLINTOCK CHANNEL
VICTORIA ISLAND
Minto Inlet
Fatik Lake
Kuujjua River
Holman
Diamond Jenness Peninsula
Johansen Bay
Albert Islands
Tahiryuak Lake
Kuuk R.
Prince Albert Sound
Burns Lake
Hadley Bay
Ekatuk River
Nanook R.
Zeta Lake
Norway Bay
Namaycush Lake
Denmark Bay
Kagloryuak R.
Wollaston Peninsula
Kugaluk R.
Quunnguq Lake
Colville Mountains
Amaiurtuq Lake
Washburn Lake
Tahoe Lake
Surrey Lake
Ekalluk River
Jayco River
Jayco L.
Collinson Peninsula
Albert Edward Bay
Halliryuak R.
Ferguson Lake
Makashook L.
Kitiga L.
Padliak Inlet
Greiner Lake
Cambridge Bay
VICTORIA STRAIT
Halovik R.
Starvation Cove
Read Island
Tassijuak L.
Tassijuak
Lauchlan R.
Byron Bay
Anderson Bay
DEASE STRAIT
Jenny Lind Island
DOLPHIN AND UNION STRAIT
Lady Franklin Point
Nakyoktok River
Richardson Islands
KENT PENINSULA
Melbourne Island
Elu Inlet
Nauyuk Lake
Labyrinth Bay
Dease Point
Foggy Bay
0
80
160
KILOMETERS
CORONATION GULF
QUEEN MAUD GULF
Coppermine
Coppermine River
Tree River
Bathurst Inlet
DISTRICT OF MACKENZIE
Ellice River
Perry River

Figure 4. Domestic fishing areas on Victoria Island which are fished between March and June ////, during July and August \\\\ , August and September ||||| , or between October and December ≡ . Dashed lines separate the areas normally fished by residents of Cambridge Bay (southeast), Coppermine (southwest), and Holman (northwest).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VICTORIA ISLAND
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Tatik Lake
Kuujjua River
Holman
Diamond Jenness Peninsula
Johansen Bay
Albert Islands
Prince Albert Sound
Tahiryuak Lake
Kuuk R.
Burns Lake
Hadley Bay
camp
Ekatuk River
Nanook R.
camp
Namaycush Lake
Zeta Lake
Norway Bay
Denmark Bay
Kagloryuak R.
Washburn Lake
Tahoe Lake
camp
Surrey Lake
Wollaston Peninsula
Kugaluk R.
Colville Mountains
Quunnguq Lake
Anmalurtuq Lake
Jayco River
Ekalluk River
Jayco L.
Collinson Peninsula
Albert Edward Bay
Pallryuak R.
Ferguson Lake
Kitiga L.
Makashook L.
Padliak Inlet
VICTORIA STRAIT
Halovik R.
Greiner Lake
Starvation Cove
Cambridge Bay
Anderson Bay
Jenny Lind Island
Reed Island
Tassijuak L.
Tassijuak R.
Leuchlan R.
Byron Bay
Byron Bay
DEASE STRAIT
DOLPHIN AND UNION STRAIT
Lady Franklin Point
Nakyoktok River
Richardson Islands
CORONATION GULF
KENT PENINSULA
Nauyuk Lake
Elu Inlet
Melbourne Island
Labyrinth Bay
Dease Point
Foggy Bay
QUEEN MAUD GULF
Ellice River
Perry River
Coppermine
Coppermine River
Tree River
Bathurst Inlet
DISTRICT OF MACKENZIE
0
80
160
KILOMETERS
72°
71°
70°
69°
68°
118°
116°
114°
112°
110°
108°
106°
104°
102°
100°

Figure 5. Sites (■) on or near Victoria Island where commercial fishermen from Cambridge Bay or Holman have harvested anadromous (searun) Arctic charr. Small squares (▪) indicate a sport fishing camp.

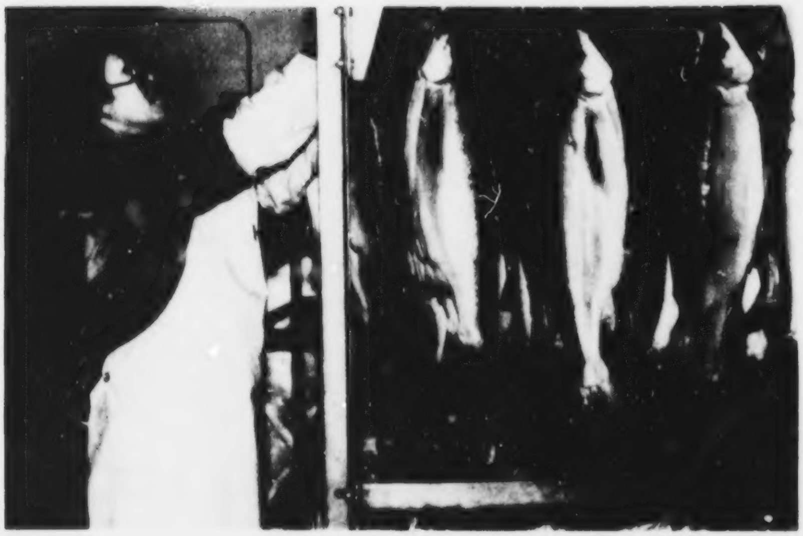

Plate 5. Cambridge Bay's Ikaluktutiak Co-operative operates the largest commercial fishery for Arctic charr in the Northwest Territories. Charr shown here are being processed at the Co-operative's freezer plant in Cambridge Bay.

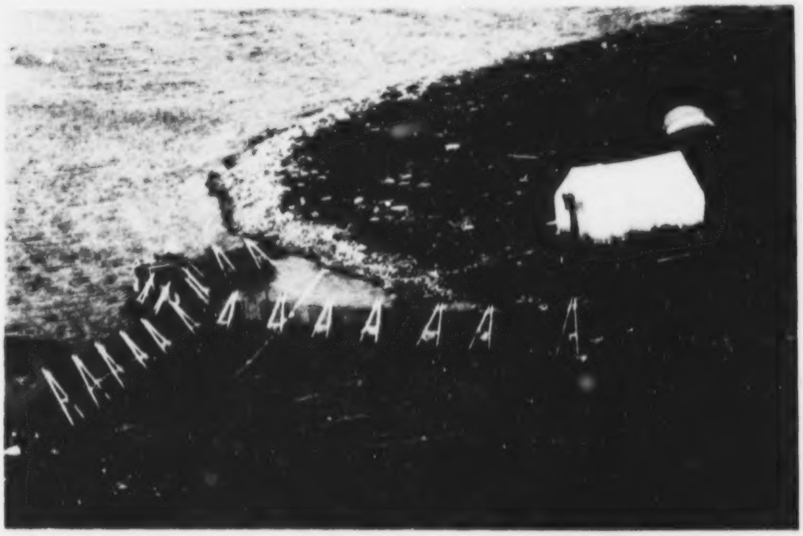

Plate 6. Weirs, like that shown here at Freshwater Creek (69°08'N, 105°00'W) on Victoria Island, are used by Department of Fisheries and Oceans personnel to enumerate and to assess the population structure of commercially important andromous (searun) Arctic charr stocks.

The Halovik, Lauchlan, and Paliryuak rivers are fished annually, usually during the spring downstream migration of anadromous Arctic charr (Barlishen and Webber 1973; Kristofferson and Carder 1980; Carder 1981; Kristofferson pers. comm.; Table 1; Fig. 5). Their charr stocks are remaining stable at current levels of exploitation. The Ekalluk, Ellice, Jayco, and Perry rivers are also fished annually, but usually during the fall upstream migration of charr. Their charr stocks are remaining stable at current levels of exploitation except in the Perry River, where overexploitation has reduced stocks. The Perry River was not fished in 1982. Other areas, including Collinson Inlet, Dease Point, Elu Inlet, Ferguson Lake, Greiner Lake, Padliak Inlet, and Starvation Cove, have been fished, in either the spring or fall, but are not fished regularly. Collinson and Elu inlets are a long way from Cambridge Bay and test fisheries there were not very productive; the Dease Point charr may not represent a discrete population; charr in Padliak Inlet and Starvation Cove are itinerants from several systems; anadromous fish in Ferguson Lake are already exploited by the Ekalluk River fishery; and, charr in Greiner River are important for domestic and sport fishermen from Cambridge Bay. Lake trout, least and Arctic cisco, and lake whitefish which are caught incidentally during the commercial fishery are eaten or fed to sled dogs. They are seldom marketed.

Attempts have been made since the early 1960's to establish a winter lake fishery for lake trout, Arctic charr, and whitefish (*Coregonus* sp., includes cisco) in the Cambridge Bay area (Barlishen and Webber 1973; Kristofferson pers. comm.). Quotas were requested for Ferguson, Surrey, Merkley, Buffit, Toassie, Kitiga, and over 75 other small lakes in the area. Few of the smaller lakes were fished and the larger lakes have not been fished commercially since 1977. A viable winter commercial fishery has not been developed because of the high cost of fishing and low market value of lake trout, which dominate catches in many of the inland lakes.

Tourists and Cambridge Bay residents angle for anadromous Arctic charr at the mouth of Freshwater Creek, during the open water period from July to September, or for trophy lake trout and anadromous Arctic charr at one of two sport fishing camps on Victoria Island (Fig. 5). High Arctic Sport Fishing Camps Ltd. operates a tourist camp on Merkley Lake (69°49'N, 107°52'W) with an outpost camp on Nanouk River (71°02'N, 108°05'W), and Arctic Charr Lodge has a tourist camp on Nakashook Lake (69°38'N, 103°36'W) with an outpost camp on a small lake south of Hadley Bay (71°27'N, 107°40'W). Guests angle in lakes and rivers near the camps during July and August and their catches are monitored by Department of Fisheries and Oceans personnel (Carder and Dahlke pers. comm.). Arctic Charr Lodge, which began in 1966, did not operate in 1982.

Holman Island

Residents of Holman, like those in Cambridge Bay, depend on Arctic charr for food. Between March and November, fishermen from the community range as far north as Prince Albert Peninsula, east to Tatik Lake, south to Investigator Island, and west to Coast Point (Fig. 4). Travelling to

Table 1. Sites fished by, and 1982 production of, the Cambridge Bay commercial fishery for anadromous (searun) Arctic charr (Kristofferson and Carder 1980; Carder 1981; Manual of Fisheries Acts and Regulations 1982; Carder, Kristofferson and Yaremchuk pers. comm.).

Waters	Coordinates	Years Fished	1982 Catch Quota (kg round weight)	1982 Production (kg round weight)
Halovik River	69°10'N, 107°40'W	1968-73, 1976-82	6 800	6 848
Lauchlan River	68°56'N, 108°30'W	1963, 1970-74, 1977-82	9 100	8 918
Paliryuak River	69°37'N, 106°40'W	1968, 1970, 1977-82	9 100	9 045
Ekalluk River	69°25'N, 106°17'W	1960, 1962-69, 1973-82	14 500	14 234
Ellice River	68°03'N, 104°00'W	1971-82	9 100	8 864
Jayco River	69°34'N, 103°21'W	1975-82	13 600	5 711
Perry River	67°43'N, 102°10'W	1977-81	11 400	-
Collinson Peninsula (Unnamed River)	69°56'N, 101°25'W	1979	4 500	-
Dease Point (Kulgayuk River)	68°16'N, 105°03'W	1972, 1974, 1976	11 400	-
Elu Inlet	68°30'N, 105°05'W	1977, 1978	-	-
Ferguson Lake	69°25'N, 105°30'W	1962-65, 1974, 1975	11 200	-
Greiner River	69°08.5'N, 104°58'W	1960, 1961	-	-
Padliak Inlet	69°16'N, 102°00'W	1977	-	-
Starvation Cove	69°09'N, 105°59'W	1977	-	-

the fishing areas by snowmobile, in spring and fall, or by boat in summer, they gillnet, jig, or angle Arctic charr, lake trout, and cod.

Tatik Lake is the main fishery for residents of Holman (Dahlke, Dickie, and Kataoyak pers. comm.). As soon as the snow and ice conditions permit travel, usually in early October, Inuit families travel from Holman to camp on the southwest shore of the lake. Up to 30 fishermen are involved in the annual harvest and they catch between 2 000 and 4 000 Arctic charr, mainly anadromous, and 200 to 600 lake trout (Dahlke pers. comm.). Fish are caught using short gillnets set under the ice and frozen intact on site. When fishing is completed, the catch is taken to the community or stored in ice houses for use later in the winter.

In the spring, Tahiryuak Lake and a number of small lakes are fished, usually in conjunction with hunting and trapping activities (Abrahamson 1964; Farquharson 1976; Jacobson 1980; Dickie and Nigiyok pers. comm.). Arctic charr and lake trout are caught by jigging through holes cut in the ice. During the summer open water season, landlocked lake trout and Arctic charr are angled from small lakes near the community. Steep cliffs make several lakes east of Holman inaccessible to fishermen. During July and August, Arctic charr, sculpin and cod are angled or netted along the shores of Minto Inlet and between Coast Point and Holman Island. Fish are also netted along the north shore of Safety Bay in late August and early September. Sculpin are not sought after or utilized, since they tangle the nets and have little food value, but cod are valued for their tasty livers. In October, several families from Holman visit Tahiryuak Lake and small lakes nearby to gillnet Arctic charr and lake trout.

In the past, Inuit fishermen caught anadromous Arctic charr at the mouths of the Kuuk and Kagloryuak rivers as the fish migrated (Abrahamson 1964; Farquharson 1976). When the Read Island Hudson's Bay post closed, the people who depended on these fish abandoned their camps and moved to Holman. Today, these rivers are seldom fished because of their distance from the community.

The commercial fishing quota for anadromous Arctic charr is 600 kg (round weight) in the Kuujjua River-Minto Inlet area (71°16'N, 116°48'W). The quota has been open for fishing regularly since 1979 and fish caught are sold through the Holman Island Co-operative (Manual of Fisheries Acts and Regulations 1982; Kristofferson pers. comm.).

Coppermine

Residents of Coppermine fish lakes and rivers on southwestern Victoria Island (Abrahamson 1964; Farquharson 1976; Jacobson 1980; Fig. 4). In the spring and fall, hunters and trappers from Coppermine visit many of the inland lakes on Victoria Island to jig or net Arctic charr and/or lake trout. In the summer, families camping near Johansen Bay (north of the Richardson Islands) and Read Island gillnet anadromous Arctic charr and cod along the coasts near their camps. Families camped at Johansen Bay gillnet anadromous

Arctic charr at the mouth of the Nakyoktok River in early to mid-July and from late August to early September as the fish migrate to and from the sea respectively.

Inuvik

In 1982, a test fishing permit was issued, allowing the Inuvialuit Development Corporation of Inuvik to take 1 350 kg (round weight) of Arctic charr from the Prince Albert Sound area (70°37'N, 117°09'W; Kristofferson and McGowan pers. comm.). Holman Island fishermen conducted the test fishery in August 1982 and the catch was processed and flown to Inuvik for sale. Total harvest statistics are not available but, data from a sample of the catch suggested that the fish may have been part of the Kuujjua River stock and that further fishing may jeopardize the Kuujjua River domestic charr fishery. Fish managers recommended that a tagging program be implemented coincident with any further test fishing in the area or, that future test fisheries be conducted at the Kagloryuak River, near the head of Prince Albert Sound.

Previous Aquatic Research

Interest in the commercial potential of Arctic charr stocks has prompted several detailed, long-term studies of charr biology in the Cambridge Bay area. Anadromous charr, which have a greater commercial potential than landlocked and lake-dwelling charr, have had their life history and general biology studied with a view toward optimizing commercial yields through better understanding of the populations involved (Johnson 1975, 1976, 1980; Kristofferson and Carder 1980; Carder 1981; Gyselman 1982). Landlocked charr stocks, which are often unexploited in this area, provide valuable examples of fish populations that are free from human interference. For this reason, they have been studied with a view toward gaining a wider understanding of fish population ecology (Johnson 1962, 1975, 1980, 1981, 1983; Hunter 1970). During these studies, many lakes and rivers on southern Victoria Island were sampled, and specimens of many of the fishes caught are preserved in the National Museum of Natural Sciences collection in Ottawa (McAllister pers. comm.).

Members of the Canadian Arctic Expedition, who visited the island between 1913 and 1918, were probably the first to collect fish from southern Victoria Island. They caught lake trout and Arctic charr in 'a lake at Colville Hills' on Wollaston Peninsula (Walters 1953a; Fig. 18, Appendix II). Collecting efforts began in earnest in 1962, when researchers from the Fisheries Research Board began long-term studies of a number of lakes on the island. Johnson (1962, 1964, 1973, 1976, pers. comm.) caught lake trout, least and Arctic cisco, lake whitefish, and ninespine stickleback in Namaycush Lake; Arctic charr, lake trout, least and Arctic cisco, and ninespine stickleback in Ferguson and Greiner lakes and fourhorn sculpin *(Myoxocephalus quadricornis)* in Ferguson Lake; Arctic charr and lake trout in "Olympique (70°18'N, 107°00'W), Bluewater (70°25'N, 106°10'W), Flambeau

(70°16'N, 106°20'W), Ekalluk (69°58'N, 105°10'W), Longspur (70°11'N, 105°22'W), and Snowbird (69°33'N, 104°11'W) lakes"; and Arctic charr in "Jaeger Lake" (69°46'N, 104°30'W). Hunter (1970), who studied Keyhole Lake (69°23'N, 106°14'W) intensively between 1962 and 1965, caught Arctic charr and ninespine stickleback in the lake. Since then, Department of Fisheries and Oceans personnel, who monitor commercial and sport fisheries on the island, have sampled anadromous Arctic charr stocks from the Halovik, Lauchlan, Paliryuak, Ekalluk, and Jayco rivers, at Freshwater Creek, and in an unnamed river on Collinson Peninsula (Kristofferson and Carder 1980; Carder 1981). They also caught lake trout and least cisco in Jayco River (McGowan pers. comm.) and Arctic charr and lake trout in Merkley Lake and Nanouk River (Carder pers. comm.). During an aquatic resource survey of the proposed Polar Gas pipeline over Victoria Island, Williams *et al.* (1981) caught Arctic charr, lake trout, lake whitefish, Arctic cisco, ninespine stickleback, and fourhorn sculpin in the Kagloryuak River system, and Arctic charr and lake trout in Tassijuak and Tahiryuak lakes and in the Kuuk and Lauchlan river systems. Lee *et al.* (1980), in their Atlas of North American Freshwater Fishes, have also reported lake whitefish in Ferguson Lake, least cisco and ninespine stickleback in Merkley Lake, and ninespine stickleback in the outlet stream to Tassijuak Lake.

Immediately north of the study area on Victoria Island, in the Kagloryuak River system, there are Arctic charr, lake trout, least cisco, lake whitefish, ninespine stickleback, and fourhorn sculpin (McAllister pers. comm.). Arctic charr and lake trout are the only species that have been reported from further inland in the Kagloryuak River, Nanouk River, and the river which drains Burns Lake (Stewart and Bernier 1982). South of the study area, river systems along the mainland coast contain all of the fish species found on Victoria Island as well as lake cisco *(Coregonus artedii)*, broad whitefish *(C. nasus)*, round whitefish *(Prosopium cylindraceum)*, Arctic grayling *(Thymallus arcticus)*, northern pike *(Esox lucius)*, burbot, longnose sucker *(Catostomus catostomus)*, and slimy sculpin *(Cottus cognatus)* (McPhail and Lindsey 1970; Stewart and MacDonald 1978; Sutherland and Gohlke 1978; MacDonald and Stewart (1980).

Biological and chemical limnology were examined in studies by Johnson (1962, 1964, 1975, 1976), Hunter (1970), Williams *et al.* (1981), and Stewart and Bernier (1982). Danks (1981) described some of the acquatic insects found on Victoria Island.

Distributions of marine fishes that have been caught in waters within or adjoining the survey area are summarized in Appendix I.

Survey Results and Discussion

Chemistry

Lakes on Victoria Island are oligotrophic and probably cold monomictic (Table 2). Ice breakup begins in June but some deep sheltered lakes in the Shaler Mountain Belt, and large lakes, like Ferguson Lake,

Table 2. Water chemistry data (means of n samples) for eleven Victoria Island lakes.

Sampling Site (Fig. 6)	1	3	4	6	8	11	13	17	23	27	28
Coordinates	70°12.5'N, 111°00'W	70°03'N, 111°17'W	69°06'N, 112°32'W	68°53'W, 112°02'W	68°34'N, 112°59'W	69°08'N, 109°39'W	69°18.5'N, 108°04'W	69°35'N, 106°58'W	69°11'N 104°40'W	70°18.5'N, 103°40'W	70°18.5'N 103°18'W
Date	5/8/82	5/8/82	4/8/82	4/8/82	6/8/82	7/8/82	10/8/82	11/8/82	27/8/82	13/8/82	13/8/82
Field Data											
Suface water temperature (°C)	6.3	7.5	8.6	8.6	4.9	9.4	9.3	10.7	4.6	9.0	2.0
Depth (m)	3.5	4	1.5	3	1	5	3.5	2.5	4	4	0.5
Time of day (h)	1100	1035	930	1000	930	1615	1230	1300	1830	1300	1230
Light conditions	clear	clear	clear	clear	clear	overcast	overcast	overcast	broken cloud,	overcast	overcast
Wind	windy	windy	windy	windy	windy	windy	calm	calm	calm	windy	windy
Secchi depth (m)	>2	>4	>1.5	>3	>1	>5	>3.5	>2.5	>4	4	0.1
Secchi color	pale green	pale green	pale green	pale green	milky green	pale green	pale green	pale green	pale green	muddy gray	muddy gray
Laboratory Data											
Number of samples (n)	2	2	2	2	2	2	2	2	2	2	2
pH	7.50	7.47	7.23	7.52	7.80	7.65	7.13	7.52	7.30	7.39	7.54
Conductivity at 25°C (µS/cm)	130	200	140	150	380	180	80	190	140	145	230
Total dissolved nitrogen (µg/L)	200	305	280	285	745	535	280	345	290	245	345
Total dissolved phosphorus (µg/L)	6	8	7	8	12	8	10	10	8	8	18
Nutrients (µg/L)											
Suspended nitrogen	64	64	62	32	102	45	54	54	62	88	270
Suspended phosphorus	6	4	6	2	12	8	3	6	5	11	82
Suspended carbon	474	557	584	420	940	476	416	383	490	777	2530
Chlorophyll A	0.2	0.3	0.4	0.1	0.8	0.4	0.2	0.2	0.6	0.4	1.6
Major Ions (mg/L)											
Sodium	0.96	0.90	1.91	1.06	16.5	1.97	0.96	5.00	5.51	2.50	4.52
Potassium	0.20	0.57	0.50	0.32	1.27	0.34	0.30	0.76	0.53	0.38	0.87
Calcium	15.8	18.2	15.4	17.5	31.4	19.8	9.80	20.1	13.0	15.8	24.0
Magnesium	8.86	12.6	9.38	9.51	27.5	12.2	5.37	12.2	8.24	9.20	15.6
Chloride	2.1	19.5	4.2	2.0	41.0	3.9	1.8	8.6	13.0	5.4	10.5
Sulphate	1.7	2.7	2.4	1.6	12.0	1.8	1.1	2.7	2.0	1.7	6.8

Table 3. Zooplankton species and their abundance (mean number of individuals per litre) in eleven lakes on Victoria Island.

Sampling Site (Fig. 6)	1	3	4	6	8	11	13	17	23	27	28
Date	5/8/82	5/8/82	4/8/82	4/8/82	6/8/82	7/8/82	10/8/82	11/8/82	27/8/82	13/8/82	13/8/82
Depth (m)	2.0	4.0	2.0	surface	1.0	5.0	3.0	2.0	4.0	4.0	surface
Number of Samples	4	2	2	2	2	2	2	2	2	2	2
Ph. Arthropoda											
Cl. Crustacea											
Sub Cl. Copepoda											
O. Calanoida											
Limnocalanus macrurus						0.10			0.15		
Eurytemora canadensis									0.03		(5.5)[1]
copepodids	0.92							0.05			
nauplii	1.22										
Diaptomus arcticus					0.10			0.05			
Diaptomus probilofensis				(9.4)[1]	0.30						
copepodids					0.50						
Diaptomus sicilis		0.30	0.65	(5.7)	0.90	0.42			1.47	0.92	(11.1)
copepodids	19.6	5.25	8.15			3.56			4.48	10.8	(77.8)
Diaptomidae copepodids				(42.4)			10.8	3.65			
nauplii	4.50	2.98	2.50	(9.2)	0.20	0.90	1.03	0.40	0.98	0.88	
O. Cyclopoida											
Cyclops capillatus	0.05	0.03	0.01		0.10		0.06				
Cyclops scutifer	0.58	2.23	5.40	(1.4)		0.04	1.23	1.10	0.03	7.37	
copepodids	0.15	7.55	1.40	(10.4)			1.20	0.90	0.15		
Cyclops vernalis					0.50						
Cyclopidae nauplii	15.0	3.85	3.30	(20.4)		0.50	13.4	24.4	2.02	1.78	
Sub Cl. Branchiopoda											
O. Cladocera											
Daphnia longiremis		7.55	0.05	(0.4)			9.43			0.88	
Daphnia middendorffiana	0.40				4.20						(5.6)
Daphnia pulex	0.28		0.05					6.70			
Daphnia pulex x middendorffiana	0.38					0.10					
Daphnia pulex x schoedleri					0.10						
Daphnia rosea		0.25									
Bosmina longirostris	0.05	0.80			0.10						
Eubosmina longispina			0.01		0.30						
Alona costata					0.001						
Alona quadrangularis					0.001						
Chydorus sphaericus		0.03		(0.7)							
Polyphemus pediculus					0.001						
Total ind/L	43.1	30.8	21.5	(100)	7.30	5.62	37.2	37.2	9.31	22.6	(100)
Number of species	8	7	7	6	12	4	4	4	4	3	3
Ph. Rotifera	31	16	53	p[2]	85	20	36	28	132	15	p[2]

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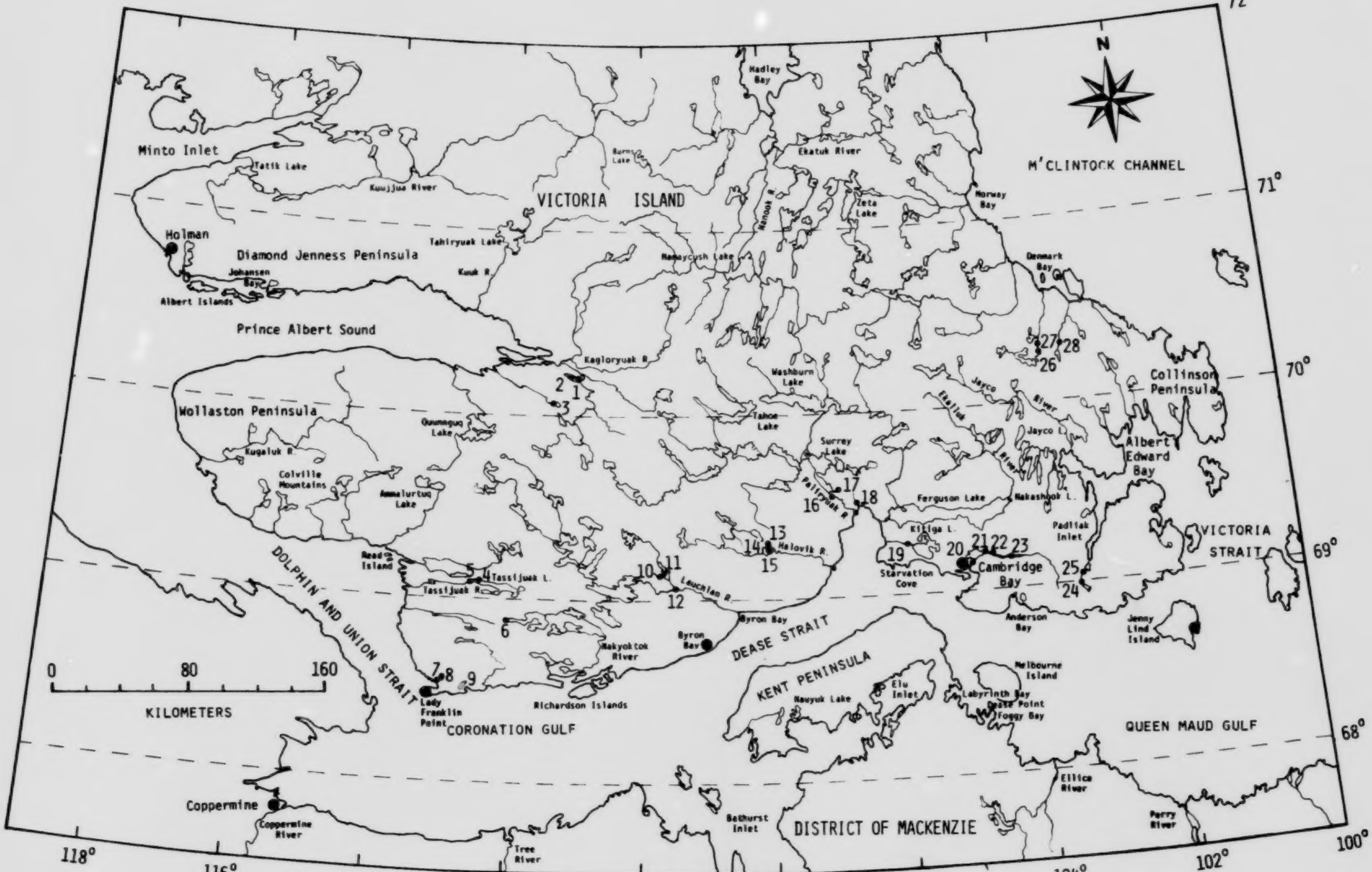
[1] numbers in brackets indicate percent of the total catch for species caught in non-quantitative surface hauls.

[2] rotifers present.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Johansen Bay
Albert Islands
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Denmark Bay
Prince Albert Sound
Kagloryuak R.
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Wollaston Peninsula
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Tahoe Lake
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Kugaluk R.
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Surrey Lake
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Bathurst Inlet
DISTRICT OF MACKENZIE
Perry River
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102°
100°

Figure 6. Sites on Victoria Island which were sampled during the 1982 survey.

still have ice in August. Freeze-up begins in late August or early September but is not complete in some areas until October. Lakes on the island can be separated chemically into three groups: inland lakes with basins of sedimentary rock, coastal lakes with basins of sedimentary rock, and upland lakes with basins of igneous rock. Water in all of these lakes is slightly alkaline.

Inland lakes with sedimentary rock basins had low ion concentrations and conductivities ranging from 80 to 230 $\mu S \cdot cm^{-1}$, with calcium and magnesium the major contributing ions and variable chloride concentrations (Table 2). They were chemically similar to inland lakes with basins of sedimentary rock on Bathurst, Cornwallis, Devon, Prince of Wales and King William islands, and on northern Victoria and Somerset islands (Stewart and MacDonald 1981; Stewart and Bernier 1982). Similar ion concentrations were reported by Johnson (1964) from Washburn and Zeta lakes. Concentrations of all the ions measured, particularly sodium and chloride, were much higher in a coastal lake with a basin of sedimentary rock. It had a conductivity of 380 $\mu S \cdot cm^{-1}$ and its waters were chemically similar to a low-lying coastal lake further to the north (Stewart and Bernier 1982), and to Nauyuk Lake on the Kent Peninsula (Johnson pers. comm.). Both lakes have only emerged from the sea within the last millenium. A lake to the north, situated on igneous rock and lacking the ion inputs from erosion common to lakes with sedimentary basins, had low ion concentrations and low conductivity, 60 $\mu S \cdot cm^{-1}$(Stewart and Bernier 1982).

Total dissolved nitrogen and phosphorus concentrations increased with the amount of shoreline vegetation present, from a low in the northern lake on igneous rock to a high in the low lying lake on the southwestern coast (Fig. 6, site 8). Nutrient concentrations were greatest where wave action was eroding unconsolidated shoreline soils and vegetation, and stirring up bottom sediments.

Water in the Greiner River system (site 23) contained 3 mg of strontium per litre, a lower concentration than has been found in other high Arctic lakes (Stewart and MacDonald 1981; Stewart and Bernier 1982).

Zooplankton

Lakes on southwestern Victoria Island have the greatest diversity of crustacean zooplankton species so far reported from the Canadian Arctic Archipelago (Patalas pers. comm.). They include species common on islands to the north and on the territorial mainland. Species abundance and diversity shows a general increase from northeast to southwest across the island.

Cyclops scutifer and *Diaptomus sicilis* occurred throughout northern (Stewart and Bernier 1982) and southern Victoria Island (Table 3). They were the most abundant species in 15 of 19 lakes sampled during August 1981 and 1982, and were mostly in their naupliar or copepodid stages of development respectively. *Daphnia longiremis*, *D. middendorffiana*, and

Limnocalanus macrurus were neither as common nor as abundant in samples analysed. They were co-dominant species with *C. scutifer* and *D. sicilis* in three of the lakes tested in 1981 and 1982. *Limnocalanus macrurus* was most common in coastal lakes and most abundant in the north. *Cyclops capillatus*, *Chydorus sphaericus*, *Daphnia pulex* x *middendorffiana*, *D. rosea*, and *D. schoedleri* were present in lakes along the island's south coast, and *D. pulex* was a co-dominant species with *C. scutifer* in one lake. *Bosmina longirostris* was common in lakes on southwestern Victoria Island, and a low-lying coastal lake in the area (site 8) also contained *Cyclops vernalis*, *Diaptomus pribilofensis*, *Alona costata*, *A. quadrangularis*, *Daphnia pulex* x *schoedleri*, and *Polyphemus pediculus*. The lake contained twelve species or forms of crustacean zooplankton and had high nutrient concentrations relative to other lakes sampled on the island. *Eurycercus lamellatus*, a large cladoceran which is not readily susceptible to net capture, was identified from the stomachs of Arctic charr and lake trout caught in lakes near the north and south coasts (Table 22, Appendix IV). *Daphnia longiremis* and a species of Cyclopinid were only caught on northern Victoria Island and *Cyclops bicuspidatus thomasi*, *Diaptomus ashlandi*, *Eurycercus glacialis*, and *Alona guttata*, species found on the mainland nearby, were not caught (Juday 1920; MacDonald and Stewart 1980; Stewart and Bernier 1982). Rotifers were found in all of the lakes sampled.

Fish

Arctic charr, lake trout, least cisco, ninespine stickleback, and fourhorn sculpin were caught on Victoria Island during the survey (Table 17, Appendix III; Figure 6). Arctic charr and least cisco were caught in drainages on the south and west coasts, lake trout and ninespine stickleback throughout southern Victoria Island, and fourhorn sculpin in two drainages in the southwest. Charr, trout, and cisco fry were often caught in shallow seasonal streams where they were protected from the predations of larger fish.

Drainages throughout Victoria Island contain lake trout and anadromous (searun), lake-dwelling, and/or landlocked populations of Arctic charr (Appendix II). Drainages across the southern half of the island contain ninespine stickleback, but they have not been reported from the northern drainages. Arctic and least cisco, lake whitefish and fourhorn sculpin occur in the major river systems and have been found wherever there has been concerted sampling. The inland extents of their distributions in drainage systems are probably limited by the presence of barriers to upstream movement and the availability of suitable large deep lakes. Lake cisco, broad and round whitefish, Arctic grayling, northern pike, burbot, longnose sucker and slimy sculpin, which are found in drainages along the mainland coast, have not been caught on Victoria Island.

Arctic charr and/or lake trout were caught in all but three of the drainages sampled on southern Victoria Island, each of which were shallow and turbid (Table 17; Figure 6; sites 1, 8, 28). Reasons why one lake contained charr or trout while another contained both species remain unclear. They occur together in lakes where charr have, or recently had, access to the sea, as well as in small deep isolated lakes (Stewart and Bernier 1982).

Catches of trout and charr per unit sampling effort were generally low, both in terms of the numbers and weight of fish caught. Between 4 and 51 charr and/or trout weighing between 3.5 and 11.6 kg were caught per 100 meters of net set in 24 h. Yields in many of the systems probably increase substantially once anadromous charr return from the sea.

Whether charr and trout occur together or alone, the trout appear to live longest, and grow larger than all but the largest anadromous charr (Table 4). Anadromous Arctic charr inhabit virtually any river system on Victoria Island where there are lakes that do not winter-kill which have passable outlets to the sea. However, during the survey of Victoria Island, most of these fish were feeding at sea and the only known anadromous fish were caught in the Freshwater Creek-Greiner Lake systems (sites 20-23). Like Crooked Lake on Prince of Wales Island, the system contains both fast and slow growing charr (Stewart and Bernier 1982). A fifteen year old fish may range in length from 504 to 708 mm and have between 206 and 2 460 μg of strontium per gram of bone tissue (Table 17). The fastest growing fish were generally in the best condition, had the highest bone strontium levels, and were host to large numbers of the marine parasite *Bothrimonus sturionis* - all of which are indicators of anadromy (Behrens Yamada *et al.* 1979; Dick and Belosevic 1981). Lake trout in this system were in excellent condition, relative to those found elsewhere on the island. Although they had access to the sea, the trout did not host *B. sturionus*, suggesting that they had not recently fed at sea.

Fast growing charr were found at several other sites (12, 13, 15) but, in the absence of strontium measurements and marine parasites, it is difficult to determine whether they were part of anadromous stocks. Slow growing lake-dwelling or landlocked charr were found in several lakes (sites 24, 25, 27). In one landlocked lake, the length-weight relationship resembled those calculated for other non-anadromous populations (Johnson 1980; Stewart and MacDonald 1981; Stewart and Bernier 1982). The length-frequency distribution tended towards bimodality (Fig. 7), a common feature of charr populations in unexploited Arctic lakes which contain only a single fish species (Johnson 1981, 1983; Stewart and MacDonald 1981; Stewart and Bernier 1982).

Arctic charr on southern Victoria Island mature between ages 7 and 11 years, at lengths greater than 390 mm; lake trout mature at about age 8 or 9 years at lengths of over 175 mm (Table 5.). One 5 year old male charr, 125 mm long, was mature and preparing to spawn (site 24). In the Arctic, precocious males are common in charr populations (Johnson 1980; Stewart and MacDonald 1981). On Victoria Island, lake trout and Arctic

Table 4. Summary of age, length, and weight data for fish from southern Victoria Island.

Sampling Location		N	Length (mm)		Weight (g)		Condition Factor[1]		Length-Weight Relationship[2]				Age (y)		
Site # (Fig. 6)	Coordinates		Mean (Range)	S.D.[4]	Mean (Range)	S.D.	Mean	S.D.	y intercept (log a)	slope (b)	S.D. of b	r^2	n	Mean (Range)	S.D.
Arctic charr															
13	69°18.5'N, 108°04'W	18	264 (136-390)	76	283 (24-750)	224	1.168	0.154	-5.826	3.370	0.066	0.994	15	4.7 (3-7)	1.4
15	69°17'N, 108°02'W	6	477 (218-557)	128	1310 (92-1875)	633	1.018	0.083					6	12.2 (4-18)	4.6
16	69°33'N, 107°04'W	7	263 (105-485)	144	406 (8-1500)	562	1.000	0.220					7	5.7 (2-15)	4.6
22[3]	69°12.5'N, 104°45'W	9	398 (160-613)	168	1007 (55-2650)	922	1.084	0.128					9	9.1 (3-13)	3.7
24	69°00'N, 103°21'W	36	210 (96-475)	121	186 (7-1170)	317	0.906	0.082	-5.066	3.010	0.029	0.997	33	6.0 (2-17)	4.4
25	69°03'N, 103°17'W	6	201 (170-260)	35	90 (45-164)	45	0.911	0.024					6	4.5 (3-8)	1.8
lake trout															
3	70°03'N, 111°17'W	13	437 (172-665)	152	1067 (56-2900)	759	0.987	0.081	-4.965	2.984	0.056	0.996	13	22.5 (5-31)	9.6
4	69°06'N, 112°32'W	20	271 (93-696)	149	425 (8-3900)	898	0.938	0.145	-5.244	3.088	0.083	0.987	17	7.5 (2-23)	5.3
6	68°53'N, 112°02'W	10	384 (96-715)	238	1261 (8-3250)	1274	1.084	0.188	-5.215	3.099	0.066	0.996	9	14.8 (2-38)	12.7
11	69°08'N, 109°39'W	10	434 (170-825)	204	1807 (50-6100)	2080	1.103	0.178	-5.433	3.183	0.069	0.996	10	22.1 (7-60)	18.2
12	69°05'N, 109°32'W	8	290 (99-635)	243	797 (9-2380)	1103	1.009	0.116					6	15.2 (3-26)	12.3
16	69°33'N, 107°04'W	5	574 (494-768)	111	2458 (1100-6100)	2051	1.119	0.174					5	15.2 (13-20)	2.8
22[3]	69°12.5'N, 104°45'W	13	367 (238-600)	110	730 (150-2220)	633	1.245	0.495	-4.410	2.798	0.288	0.896	13	14.4 (8-31)	6.4
25	69°03'N, 103°17'W	10	374 (115-690)	222	1150 (12-2850)	1209	1.039	0.190	-5.447	3.184	0.0[illegible]9	0.996	10	13.9 (2-30)	11.0
27	70°18.5'N, 103°40'W	8	533 (470-665)	64	1548 (1050-2600)	470	1.015	0.132					8	29.4 (21-38)	6.2
least cisco															
15	69°17'N, 108°02'W	13	406 (123-509)	129	932 (10-1760)	495	1.043	0.223	-6.331	3.512	0.052	0.998	13	11.6 (2-23)	5.6

[1] condition factor = weight in g$\cdot$(fork length in mm)$^{-3}\cdot 10^{5}$

[2] log weight in g = b$\cdot$log length in mm + log a

[3] fish from adjacent lakes, sites 22 and 23, combined.

[4] S.D. = standard deviation from the mean ($\overline{x}$).

Table 5. Summary of sexual maturity data for fish from southern Victoria Island.

Site # (Fig. 6)	Date	N	Sex	Maturity							Age of youngest mature fish (y)	Length of youngest mature fish (mm)
				Immature	Mature	Near Ripe	Ripe	Ripe & Running	Spent	Unknown		
Arctic charr												
13	10/8/82	7	Male	6	1						7	390
		6	Female	6								
		13	Total	12	1							
15	10/8/82	3	Male	1	2						13	519
		3	Female		1	2					12	510
		6	Total	1	3	2						
16	11/8/82	5	Male	5								
		2	Female	1	1						15	485
		7	Total	6	1							
22[1]	28/8/82	4	Male	2	1	1					12	613
		5	Female	2	1	1	1				11	478
		9	Total	4	2	2	1					
24	15/8/82	20	Male	13	4	3					5	125
		11	Female	10	1						13	458
		34	Total	23	5	3				3		
25	15/8/82	3	Male	3								
		3	Female	3								
		6	Total	6								
lake trout												
3	5/8/82	7	Male	1	3	3					8	192
		6	Female	1	4	1					29	509
		13	Total	2	7	4						
4	4/8/82	12	Male	11		1					23	696
		8	Female	7	1						18	556
		20	Total	18	1	1						
6	4/8/82	7	Male	3	1	3					15	500
		2	Female	1	1							425
		9	Total	4	2	3						
11	7/8/82	7	Male	3	1	3					24	545
		2	Female	1	1						25	700
		10	Total	4	2	3				1		
12	7/8/82	3	Male		1	2					9	176
		1	Female		1						20	532
		8	Total		2	2				4		
16	11/8/82	1	Male			1					20	786
		4	Female	3		1					15	518
		5	Total	3		2						
22[1]	28/8/82	4	Male	1	2			1			13	350
		9	Female	6	1			2			17	469
		13	Total	7	3			3				
25	15/8/82	1	Male	1								
		9	Female	4	2	3					17	530
		10	Total	5	2	3						
27	13/8/82	2	Male			2					32	479
		6	Female		3	3					21	470
		8	Total		3	5						
least cisco												
15	10/8/82	3	Male			3					10	419
		8	Female		4	4					9	413
		14	Total		4	7				3		

[1] fish from adjacent lakes, sites 22 and 23, combined.

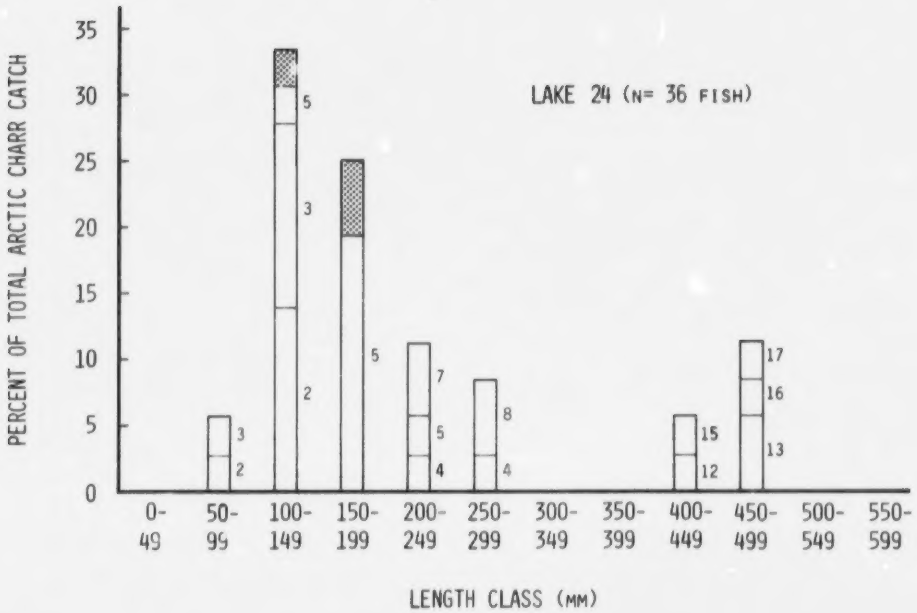

Figure 7. Age-frequency distributions by length class in the catches of Arctic charr from lake 24 (60°00'N, 100°21'W) on Victoria Island. Stippling indicates fish whose ages were not determined.

charr begin spawning in early September and probably continue into October. Individual fish do not appear to spawn annually, since less than 50% of the mature fish were entering spawning condition in mid-August. None of the recently returned searun fish in the Freshwater Creek-Greiner Lake system were preparing to spawn.

Charr and trout both fed on a wide variety of items (Tables 17 and 20, Appendix III). During August, chironomids, fish, and algae balls *(Nostoc* sp.*)* formed the bulk of their stomach contents. Trichopterans, amphipods, mysids, sphaerids, and a variety of other invertebrate species were also eaten (Appendix IV). The trout were more inclined to be piscivorous, sometimes cannibalistic, and ate more trichopterans and amphipods. Searun Arctic charr were eating Arctic cod *(Boreogadus saida)*, and marine amphipods.

Diphyllobothrium spp. were the metazoan parasites most commonly found in Arctic charr and, with *Cystidicola cristivomeri*, were the most common metazoan parasites infecting lake trout (Table 17). Charr and trout on southern Victoria Island were host to *Cystidicola cristivomeri*, *Philonema agubernaculum*, *Thynnascaris adunca*, *Diphyllobothrium dendriticum*, *D. ditremum*, *Eubothrium salvelini*, *Proteocephalus* sp., *Echinorhynchus* sp., *Metechinorhynchus salmonis*, and *Salmincola edwardsii* (Tables 17 and 21, Appendix III). Charr also had *Cystidicola farionis*, *Cyathocephalus truncatus*, and *Salmincola carpionis*, and large numbers of *Bothrimonus sturionis* infected searun charr. Lake trout were parasitized by *Proteocephalus arcticus* and *Crepidostomum farionis*. In charr the infection levels were low except for *B. sturionis*, which is vectored by a marine amphipod, and *C. cristivomeri*, vectored by *Mysis relicta* (Eddy and Lankester 1978; Smith and Lankester 1979). In trout, *Cystidicola cristivomeri*, *Echinorhynchus* sp., and *Metechinorhynchus salmonis*, and rarely *Thynnascaris adunca*, *Proteocephalus* sp., and *Proteocephalus arcticus* were present in large numbers. A greater variety of metazoan parasites were found in charr and trout that inhabited the southern drainages on Victoria Island, than in those further to the north (Stewart and Bernier 1982).

Least cisco were caught in four drainages along the south coast of Victoria Island (Table 17, Fig. 6). All of the fish had good access to the sea, and those caught in the Halovik River were in good condition and lived longer (23 years) and grew larger (509 mm) than least cisco in other areas of the Arctic (Table 4; McPhail and Lindsey 1970; Scott and Crossman 1973; Alt 1980; MacDonald and Stewart 1980; Bond 1982; Stewart and Bernier 1982). The youngest mature fish were 9 years old and 410 mm long (Table 5). They did not spawn annually and unlike cisco populations on King William and Prince of Wales islands (Stewart and Bernier 1982), there were mature non-spawning fish in the catch. Spawning probably occurs throughout September. Juvenile least cisco, aged 1 to 3 years, inhabited shallow seasonal streams to avoid larger predatory fish. Least cisco aged just over 1 year ranged in length from 54 to 90 mm while those aged 2 to 3 years ranged in length from 129 to 150 mm (site 14).

During August, the adult cisco had mainly chironomids, sphaerids, and crustaceans in their stomachs (Tables 17, 20,and 21). They were often infected by small numbers of *Cyathocephalus truncatus*, *Diphyllobothrium dendriticum*, *D. ditremum*, *Crepidostomum farionis*, and *Metechinorhynchus salmonis* (Tables 17 and 21). The year old fish ate mainly copepods and some chironomids, unidentified dipterans, and hydracarina. They were host to small numbers of *Proteocephalus exiguus*, which infected 62% of the fish, *Metechinorhynchus salmonis* 7%, *Crepidostomum farionis* 5%, and *Diphyllobothrium ditremum* 5%. None of the 2 to 3 year old fish had food in their stomachs, but they were host to the same parasite species. The incidences of infection remained low except for *P. exiguus*, which were sometimes present in large numbers.

Ninespine stickleback, an important forage fish, were present throughout southern Victoria Island (Table 17). Specimens were preserved for future analysis. Fourhorn sculpin are thought to be a glacial relict species and were present in two lakes (sites 4 and 11). They are widely distributed in Arctic freshwater lakes and the marine form occurs throughout Arctic coastal waters (Johnson 1962, 1964; McAllister and Aniskowicz 1976; Stewart and Bernier 1982). Marine fourhorn sculpin were caught offshore Cambridge Bay and fish doctor *(Gymnelis viridis)* and Arctic cod were identified in the diets of charr returning from the bay.

KING WILLIAM ISLAND AND ADELAIDE PENINSULA

General Description

King William Island is situated east of Victoria Island and south of Prince of Wales Island, in a notch of the territorial mainland formed where Boothia Peninsula extends from the Queen Maud Gulf coast (Fig. 1). It has a surface area of 12 500 km^2 and a uniformly low regular coastline. Adelaide Peninsula, south of King William Island is a low-lying, irregular peninsula extending northward from the coast.

King William Island and Adelaide Peninsula lie entirely within the Victoria Lowland physiographic region (Bostock 1970, 1972; Fig. 2). They are underlain by Lower Palaeozoic rocks which are composed mainly of limestone and dolomite, with lesser amounts of sandstone and shale (Blackadar and Christie 1963; Craig 1964). The bedrock is mostly flat-lying or gently dipping and the highest elevation on the island is less than 100 m asl (Fig. 3). Glacial drift cover is almost continuous over the areas's surface and glacial landforms dominate the landscape.

The last Laurentide Ice Sheet covered King William Island and Adelaide Peninsula until between 8 and 9 thousand years ago (Prest *et al.* 1972; Prest 1973). Following the glacier's southward retreat, the area was covered by ocean and it has gradually rebounded to nearly 100 m above the present sea level (Craig 1964; Andrews 1972; Prest 1973). Eskers, moraines, and drumlins are common across the island and peninsula and they continue to disrupt drainage patterns destroyed by glaciation (Dunbar and Greenway 1956; Craig 1964). Drainage systems remain disorganized and are characterized by the presence of many small ponds and lakes, some joined by streams and others with no apparent outlet.

The climate of King William Island and Adelaide Peninsula closely resembles that of southern Victoria Island and Boothia Peninsula (Thomson 1967; Allen 1971; Fletcher and Young 1976; Maxwell 1981). There is a mean annual temperature range of 42 to 45°C with mean daily temperatures near or slightly below -34°C in January and between 8 and 10°C in July. The mean daily temperature remains below 0°C from early September until early June and low cloud and fog are common in July and August when sea-ice is still present. Rainfall comprises 50 to 60% of the 100 to 150 mm of annual precipitation. Snowfall during the winter is light, less than 625 mm, and the frozen land and lakes are swept by winds from the northwest. Snowmelt and runoff occur in late June and early July and peak stream flows normally occur as a result. Breakup begins in late June and freeze-up is complete by mid-October. Channels surrounding the island are generally clear of sea-ice by mid-August except north of Matty Island and Collinson Inlet where channels remain 70 to 90% covered by first year sea-ice.

Lush growths of grasses, sedges, and mosses surround many of the low-lying lakes on King William Island. Few plant collections have been made on the island and the vegetation types are not well known. Porsild (1957, 1964) and Porsild and Cody (1980) have reported distribution records of vascular plant species collected on the island.

In August, breeding whistling swans and snow and blue geese *(Anser caerulescens* ssp.) are common on lakes throughout King William Island; ringed *(Phoca hispida)* and bearded seals *(Erignathus barbatus)* occur in the pack-ice west of the island; and beluga whales *(Delphinapterus leucas)* occur in the entrance to Chantrey Inlet. Large terrestrial mammals are rare on the island and hunters travel to the mainland to hunt caribou and muskoxen.

There has not been the interest in natural resource development on King William Island and Adelaide Peninsula that has been shown recently in the High Arctic, and there are no plans to build natural gas pipelines on the island. Consequently, detailed environmental research is lacking.

Gjoa Haven is the only community in the area and Gladman Point is the only D.E.W. line station (Fig. 1). Gjoa Haven (68°38'N, 95°58'W) is situated on the southeast coast of King William Island, beside a fine natural harbour. It is there that explorer Roald Amundsen spent the winters of 1903 and 1906 in his ship 'Gjoa', the first vessel to navigate the Northwest Passage. The Hudson's Bay Company established a trading post beside the bay in 1927 and the present community of 517 persons has grown up around the post. The economy is based on hunting, trapping, fishing, carving, and some wage employment (Brice-Bennett 1976; Government of the Northwest Territories 1982). In 1957, a D.E.W line site was established at Gladman Point, near an abandoned Canalaska Trading Company post that operated between 1927 and 1938. The site provides some employment for the local Inuit.

Domestic, Commercial, and Sport Fishing

Fish, particularly anadromous Arctic charr, are an important food for residents of Gjoa Haven. Between March and December, fishermen from the community range as far south as Back River, east to Murchison River, west to Terror Bay, and north to Port Parry (Fig. 8). Travelling to the fishing areas by snowmobile in the spring and fall, or by boat in the summer, they gillnet,jig, or spear Arctic charr, lake trout, least and Arctic cisco, and cod.

Most of the fish are caught by Inuit domestic fishermen who use them to feed their families. From March to June and October to December, they net or jig fish from under the ice of freshwater lakes. Landlocked Arctic charr and/or lake trout are caught in Tasekyoak Lake, in the Swan Lakes, and in many other unnamed lakes on King William Island and northern Adelaide Peninsula (Fig. 8). Searun Arctic charr, lake trout, and least or Arctic cisco are caught in Koka Lake, in lakes near Port Parry, and in several unnamed lakes on southern King William Island and Adelaide Peninsula.

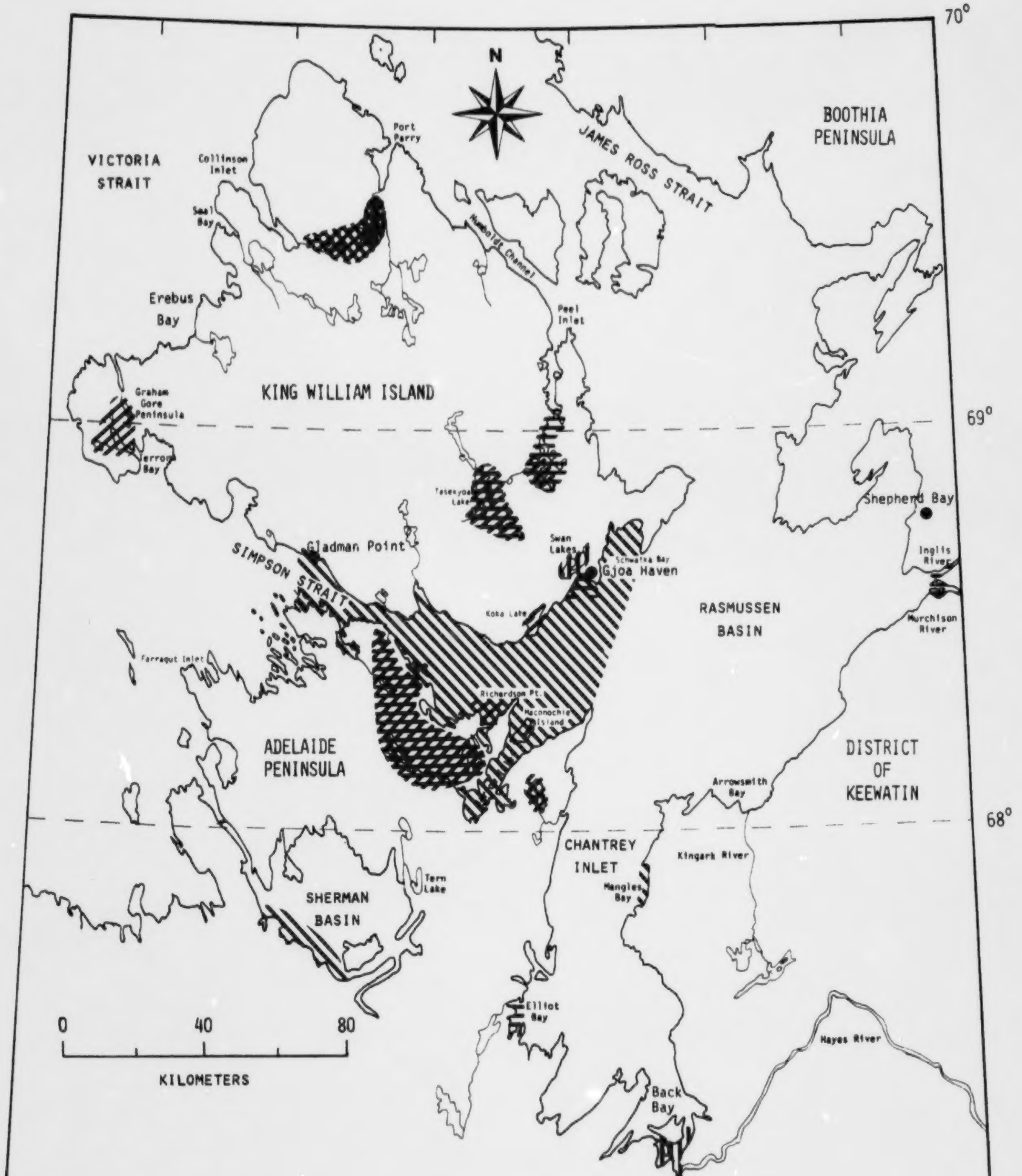
N
VICTORIA STRAIT
Collinson Inlet
Port Parry
JAMES ROSS STRAIT
BOOTHIA PENINSULA
Seal Bay
Humboldt Channel
Erebus Bay
Peel Inlet
KING WILLIAM ISLAND
Graham Gore Peninsula
Terror Bay
Tasekyoak Lake
Shepherd Bay
Swan Lakes
Schwatka Bay
Gladman Point
Gjoa Haven
SIMPSON STRAIT
Inglis River
Koka Lake
RASMUSSEN BASIN
Murchison River
Farragut Inlet
Richardson Pt.
Maconochie Island
ADELAIDE PENINSULA
DISTRICT OF KEEWATIN
Arrowsmith Bay
CHANTREY INLET
Kingark River
Tern Lake
Mangles Bay
SHERMAN BASIN
0
40
80
KILOMETERS
Elliot Bay
Hayes River
Back Bay
Back River
70°
69°
68°
67°
99°
98°
97°
96°
95°
94°

Figure 8. Domestic fishing areas on King William Island and Adelaide Peninsula which are fished by residents of Gjoa Haven between March and June ///, during July and August \\\, August and September |||||, or between October and December ☰.

During July and August, nets are set along the southern coast of King William Island between Gladman Point and Schwatka Bay, along the northern coast of Adelaide Peninsula between Farragut Inlet and the east side of Barrow Inlet, along the west coast of Chantrey Inlet, and along the south coast of Sherman Basin. Anadromous Arctic charr, Arctic cisco, and cod are the main species caught. During July, anadromous Arctic charr are also speared as they pass beneath pans of ice in the Richardson Point-Maconachie Island area. A late ice break-up and an abundance of charr make the area ideal for spear fishing. Some jigging also takes place. In late August and early September, anadromous Arctic charr are netted at river mouths as they return upstream to overwinter in fresh water. Many of these rivers, those flowing into Peel Inlet and along southern King William Island and northern Adelaide Peninsula excepted, are also fished commercially at the same time. In the past, charr were speared at stone fish weirs (Saputits) which spanned the rivers upstream from the river mouths (Brice-Bennet 1976; Dickie, Hiqiniq, Ikkuisliuq, Konogak, Orr, Pooloongiak, Pootogoo, Porter, and Tiriganeak pers. comm.).

Commercial fishing for anadromous (searun) Arctic charr may provide important economic benefits for the community of Gjoa Haven. At present, members of Gjoa Haven's Hunters and Trappers Association net anadromous Arctic charr at Port Parry to provide fish to members of the community who are unable to fish (Dickie pers. comm.). The fishery is small, with a quota of 2 268 kg (round weight), and has taken place annually since 1977, between October and December (Yaremchuk pers. comm.). In 1977, the Gjoa Haven Settlement Council requested assistance from the Department of Economic Development and Tourism of the Government of the Northwest Territories to establish a commercial fishery and fish processing plant in the community (Kristofferson *et al.* 1982).

To assess the economic feasibility of establishing a fish processing plant in Gjoa Haven, commercial test fisheries were conducted between 1979 and 1982 at seven localities in the Gjoa Haven area (Fig. 9; Table 6; Plates 1, 7, 8). Fishermen harvested primarily anadromous Arctic charr, with incidental catches of lake trout, Arctic cisco, burbot, and lake whitefish. Studying the catch, fish managers found that the Back River, which is already harvested by sports and domestic fishermen, can support a commercial fishery and recommended that it be assigned a quota of 9 100 kg (round weight; Kristofferson *et al.* 1982; Manual of Fisheries Acts and Regulations 1982; Kristofferson and Yaremchuk pers. comm.). A provisional quota of 4 500 kg (round weight) was recommended for the Hayes River until it is known whether the river supports a discrete charr population. They found that the Murchison River, which has been fished sporadically since 1973, can support a commercial fishery and they recommended that the present quota, 9 100 kg (round weight) of anadromous Arctic charr, be maintained. A provisional quota may be assigned to the Kingark River, provided there is a fall upstream charr run and subject to stock identification through a tagging program coincident with the fishery. Elliot Bay and Tern Lake were found to have commercial potential but more research is needed before quotas can be assigned. No quota was recommended for Mangles Bay, where the charr

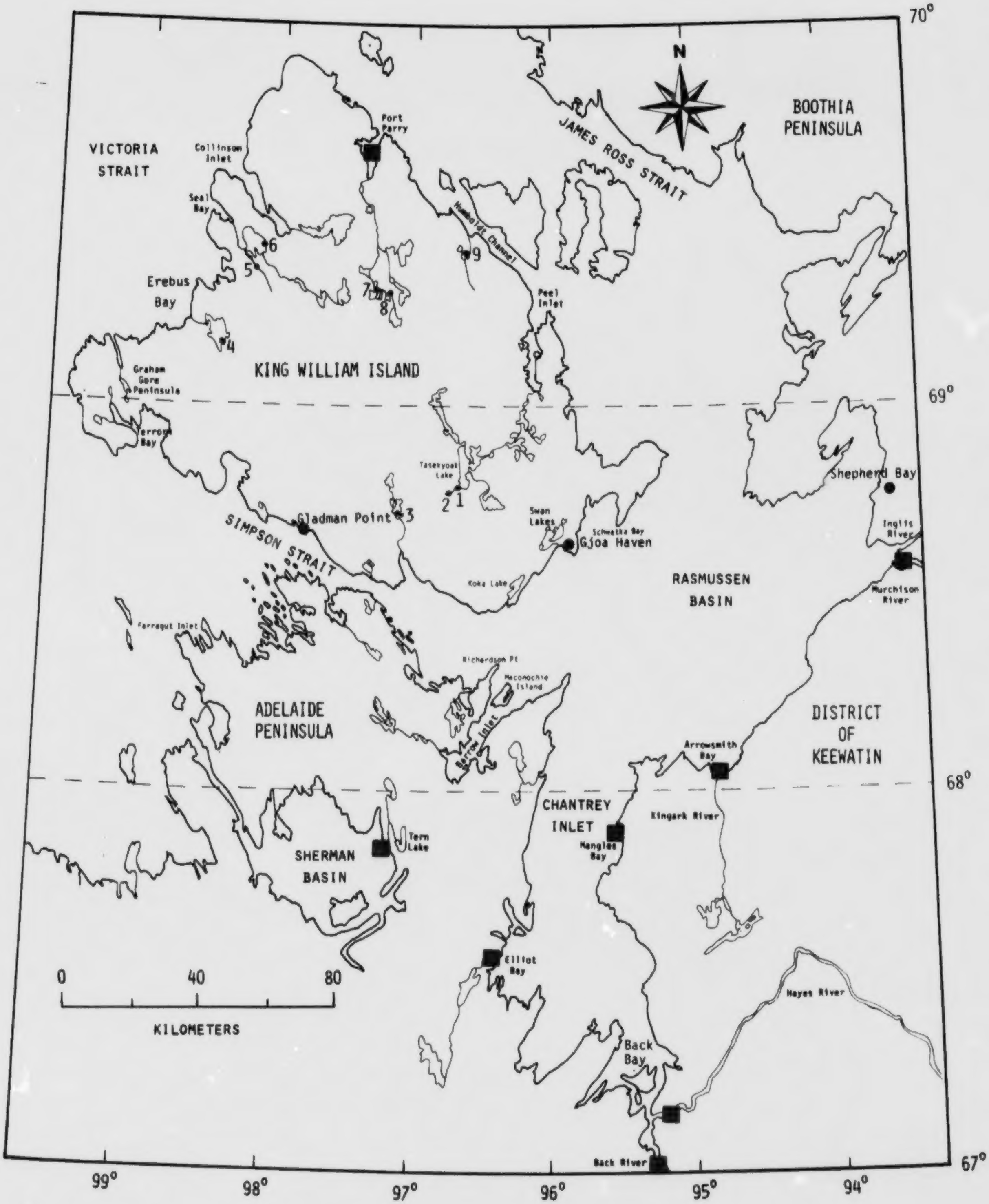
70°
N
BOOTHIA
PENINSULA
VICTORIA
STRAIT
Collinson
Inlet
Port
Parry
JAMES ROSS STRAIT
Seal
Bay
Humboldt Channel
6
5
9
Erebus
Bay
7
8
Peel
Inlet
4
KING WILLIAM ISLAND
Graham
Gore
Peninsula
69°
Terror
Bay
Tasekyoak
Lake
Shepherd Bay
2
1
Gladman Point
3
Swan
Lakes
Schwatka Bay
Gjoa Haven
Inglis
River
SIMPSON STRAIT
RASMUSSEN
BASIN
Koka Lake
Murchison
River
Farragut Inlet
Richardson Pt
Maconochie
Island
ADELAIDE
PENINSULA
Barrow Inlet
DISTRICT
OF
KEEWATIN
Arrowsmith
Bay
68°
CHANTREY
INLET
Kingark River
Tern
Lake
SHERMAN
BASIN
Mangles
Bay
Elliot
Bay
0
40
80
KILOMETERS
Hayes River
Back
Bay
Back River
67°
99°
98°
97°
96°
95°
94°

Figure 9. Sites (1-9) on King William Island which were sampled during the 1982 survey, or (■) where commercial fishermen from Gjoa Haven harvest anadromous (searun) Arctic charr.

Table 6. Sites fished by, and 1982 production, of commercial test fisheries for anadromous (searun) Arctic charr in the vicinity of Gjoa Haven (Kristofferson *et al.* 1982; Manual of Fisheries Acts and Regulations 1982; Kristofferson and Yaremchuk pers. comm.).

Waters	Coordinates	Years Fished	1982 Catch Quota (kg round weight)	1982 Production (kg round weight)
Port Parry	69°40'N, 97°20'W	1977-1980, 1982	2 300	?[1]
Back River	67°15'N, 95°15'W	1979, 1980	9 100[2]	-
Hayes River	67°18'N, 95°02'W	1982	4 500[2]	2 470
Murchison River	68°35'N, 93°30'W	1973, 1974, 1979, 1980	9 100	-
Kingark River	68°01'N, 94°50'W	1979, 1980	-	-
Elliot Bay	67°46'N, 97°00'W	1979	-	-
Tern Lake	67°48'N, 97°02'W	1979, 1980	-	-
Mangles Bay	67°28'N, 95°25'W	1979, 1980	-	-

[1] quota opened for fishing in 1982 but production is unknown.

[2] quotas recommended in 1982 for the 1983 fishing season.

Plate 7. A test fishery was conducted at this site on the Hayes River ($66^\circ09'N$, $95^\circ04'W$) in September 1982. Commercial fishermen from Gjoa Haven hope to harvest Arctic charr from the river on an annual basis.

Plate 8. Commercial fisherman Peter Ikkuisiliuq, from Gjoa Haven, removes livers from burbot caught in the Hayes River ($66^\circ09'N$, $95^\circ04'W$). Burbot livers are valued for their high fat and vitamin content.

are itinerants from other river systems. A decision will be made concerning the processing plant sometime in 1983.

Residents of Gjoa Haven and D.E.W. line employees angle anadromous Arctic charr from the ocean, off the southern shore of King William Island. Fishing occurs throughout the open water season, July to September, and residents of Gjoa Haven hold a community fishing contest in early September, awarding prizes for the first and largest fishes caught.

Previous Aquatic Research

River systems with commercial fishing potential have been the focus of most aquatic research in the King William Island-Adelaide Peninsula vicinity (Kristofferson *et al.* 1982). There are few published records of aquatic and marine research in the area. Pfaff (1937) reported that members of the Fifth Thule Expedition collected cisco *(Coregonus* sp.*)*, lake trout and ninespine stickleback from King William Island and ninespine stickleback, Arctic charr, Arctic cod, and fourhorn sculpin from marine water along the island's south coast. Lee *et al.* (1980) indicated that Arctic cisco have been caught between the island and Adelaide Peninsula, and that lake trout have been caught in northern lakes on the island. Marine sampling has been more extensive and is summarized in Appendix I.

Survey Results and Discussion

Chemistry

Lakes sampled on King William Island were oligotrophic and probably cold monomictic (Table 7). All were situated on sedimentary rock and were ice-free in mid-August. They were chemically similar to lakes with sedimentary basins on southern Victoria and Prince of Wales islands (Table 2; Stewart and Bernier 1982). Surface waters of the lakes were slightly basic; conductivities ranged from 100 to 180 $\mu S \cdot cm^{-1}$, with calcium and magnesium the major contributing ions; and, dissolved nitrogen and phosphorus concentrations were in the mid-range for lakes in the Arctic islands with sedimentary basins. Nutrient concentrations were moderate in lakes which had shoreline vegetation and poorly consolidated shoreline soils, and low in a lake with a boulder shore (site 9), probably due to differential nutrient inputs through shoreline erosion. Waters of the landlocked lake (site 9) had a strontium concentration of 2 - 3 $\mu g \cdot L^{-1}$.

Zooplankton

Limnocalanus macrurus, *Eurytemora canadensis*, and *Cyclops scutifer* were the most common and numerous crustacean zooplankters in lakes sampled on King Williams Island (Table 8). In mid-August, most of the *C. scutifer* were in their naupliar stages of development. Other zooplankters which were not as common or abundant included *Cyclops magnus*, *Daphnia schoedleri*,

Table 7. Water chemistry data (means of n samples) for four King William Island lakes.

Sampling Site (Fig. 9)	1	6	7	9
Coordinates	68°47'N, 96°38'W	69°23'N, 98°12'W	69°17'N, 97°18'W	69°23'N, 96°38'W
Date	16/8/82	17/8/82	18/8/82	18/8/82
Field Data				
Surface water temperature (°C)	6.5	7.3	6.4	6.5
Depth (m)	3	3	1.8	7
Time of day (h)	1615	1415	1500	1430
Light conditions, wind	clear, light wind	clear, windy	clear, windy	clear, windy
Secchi depth (m)	>3	>3	>1.8	>7
Secchi color	pale green	dark green	pale green	pale green
Laboratory Data				
Number of samples (n)	2	2	2	2
pH	7.13	7.10	7.47	7.53
Conductivity at 25°C (μS/cm)	180	110	170	160
Total dissolved nitrogen (μg/L)	370	230	350	175
Total dissolved phosphorus (μg/L)	8	8	8	6
Nutrients (μg/L)				
Suspended nitrogen	92	82	102	47
Suspended phosphorus	8	12	6	4
Suspended carbon	737	700	942	430
Chlorophyll A	0.6	0.6	0.9	0.3
Major Ions (mg/L)				
Sodium	4.68	3.07	2.11	3.40
Potassium	0.63	0.41	0.44	0.39
Calcium	18.4	11.2	19.6	18.8
Magnesium	10.8	6.9	10.9	10.2
Chloride	10.8	6.4	4.0	6.6
Sulphate	2.7	1.7	2.2	1.8

Table 8. Zooplankton species and their abundance (mean number of individuals per litre) in four lakes on King William Island.

Sampling Site (Fig. 9)	1	6	7	9
Date	16/8/82	17/8/82	18/8/82	18/8/82
Depth (m)	3.0	3.0	1.8	7.0
Number of Samples	2	2	2	2
Ph. Arthropoda				
Cl. Crustacea				
Sub Cl. Copepoda				
O. Calanoida				
Limnocalanus macrurus	0.61	0.07		0.37
Eurytemora canadensis	0.30			
copepodids		0.03		
nauplii		0.20		0.11
O. Cyclopoida				
Cyclops magnus	0.20			
Cyclops scutifer			0.89	0.08
copepodids			0.44	0.08
Cyclopidae nauplii	0.40	4.67	8.60	0.78
Sub Cl. Branchiopoda				
Daphnia pulex x middendorffiana			0.71	
Daphnia schoedleri	0.03			
Bosmina longirostris	0.07		0.22	
Chydorus sphaericus				0.01
Total ind/L	1.61	4.97	10.9	1.43
Number of Species	5	3	3	4
Ph. Rotifera	18	113	p[1]	23

[1] rotifers present, not counted.

D. pulex x *middendorffiana*, *Bosmina longirostris*, and *Chydorus sphaericus*. The island's zooplankton fauna resembled that on Prince of Wales Island in that, *Limnocalanus macrurus* and *Cyclops scutifer* were the co-dominant species; *Daphnia* sp. were present in small numbers; and diaptomids, which are common on the mainland and Victoria Island,were absent (Table 22, Appendix IV; Macdonald and Stewart 1980; Stewart and Bernier 1982). Crustacean zooplankters were not abundant in any of the lakes and rotifers were present in variable numbers in all of the lakes sampled.

Fish

Arctic charr, lake trout, least cisco, and ninespine stickleback were caught on King William Island during the survey (Table 18, Fig. 9). Arctic charr were caught wherever lakes were deep enough for them to overwinter, ninespine stickleback wherever small mesh traps were set, least cisco in two northern river systems, and a single lake trout was caught in Tasekyoak Lake. Fish were not caught in two shallow turbid lakes (sites 3 and 4).

With the possible exceptions of the Douglas River system (site 3) and a river system which drains into Erebus Bay (site 4), where lakes are shallow, turbid, and probably winterkill, Arctic charr and ninespine stickleback appear to be distributed throughout King William Island (Appendix II). Anadromous (searun) Arctic charr utilize all passable river systems which connect deep lakes with the sea, notably those draining into Terror and Seal bays, Collinson and Peel inlets, and Port Parry. Least cisco also occur in these systems but may be absent from some of the smaller landlocked lakes (eg. site 9). Lake trout do not appear to be as common or numerous in these rivers, but are present in Tasekyoak Lake and in lakes along the island's south coast. Arctic cisco are reported to inhabit lakes along the south coast and, together with the other species, lakes on Adelaide Peninsula. The peninsula, like King William Island, has many lakes that are shallow and winterkill.

Arctic charr caught on the Island were generally small and slow growing and, with one exception (site 6), were from either lake-dwelling or landlocked populations (Table 18). The lake dwelling charr were in good condition, with mean condition factors greater than 1.0 (sites 1 and 6), while the landlocked charr were in poorer condition with mean condition factors less than 0.9 (site 9, Table 9). Their length-weight relationships were similar to those found in lake-dwelling and landlocked charr populations elsewhere in the Arctic islands (Johnson 1980; Stewart and MacDonald 1981; Stewart and Bernier 1982). Fish in the landlocked population had a narrow range and low concentrations of strontium in their bones (31 - 74 $\mu g \cdot g^{-1}$, x = 61 $\mu g \cdot g^{-1}$. The length-frequency distribution of charr caught in the lake tended towards bimodality, a common feature of charr populations in unexploited single species Arctic lakes (Fig. 10A; Johnson 1981, 1983; Stewart and MacDonald 1981; Stewart and Bernier 1982). Ages varied widely within each length class.

Table 9. Summary of age, length, and weight data for Arctic charr and least cisco from King William Island.

Sampling Location		N	Length (mm)		Weight (g)		Condition Factor[1]		Length-weight Relationship[2]				Age (y)		
Site # (Fig. 9)	Coordinates		Mean (Range)	S.D.[3]	Mean (Range)	S.D.	Mean	S.D.	y intercept (log a)	slope (b)	S.D. of b	r^2	n	Mean (Range)	S.D.
Arctic charr															
1	68°47'N, 96°38'W	25	369 (123-528)	89	590 (14-1330)	346	1.016	0.096	-5.248	3.099	0.065	0.990	24	9.5 (3-21)	3.8
6	69°23'N, 98°26'W	12	318 (252-399)	56	356 (144-620)	186	1.020	0.150	-5.229	3.094	0.265	0.932	12	9.0 (6-14)	2.8
9	69°23'N, 96°38'W	34	341 (99-503)	116	457 (6-1300)	302	0.870	0.120	-5.284	3.088	0.049	0.992	32	14.9 (2-26)	6.4
least cisco															
6	69°23'N, 98°12'W	59	286 (110-369)	72	282 (11-480)	133	1.005	0.132	-5.521	3.213	0.044	0.990	58	9.6 (1-15)	3.5

[1] Condition Factor = Weight in g·(fork length in mm)$^{-3}$·10^{5}.

[2] log weight in g = b·log length in mm + log a.

[3] S.D. = standard deviation from the mean ($\bar{x}$).

Table 10. Summary of sexual maturity data for Arctic charr and least cisco from King William Island.

Site # (Fig. 9)	Date	N	Sex	Maturity							Age of youngest mature fish (y)	Length of youngest mature fish (mm)
				Immature	Mature	Near Ripe	Ripe	Ripe & Running	Spent	Unknown		
Arctic charr												
1	16/8/82	14	Male	6	8						7	330
		11	Female	7	4						8	440
		25	Total	13	12							
6	17/8/82	2	Male		1	1					14	399
		11	Female	5	5	1					7	260
		13	Total	5	6	2						
9	18/8/82	18	Male	2	12	4					5	112
		15	Female	5	9	1					13	386
		34	Total	7	21	5				1		
least cisco												
6	17/8/82	31	Male	4	1	26					6	233
		24	Female		5	19					6	234
		59	Total	4	6	45				4		

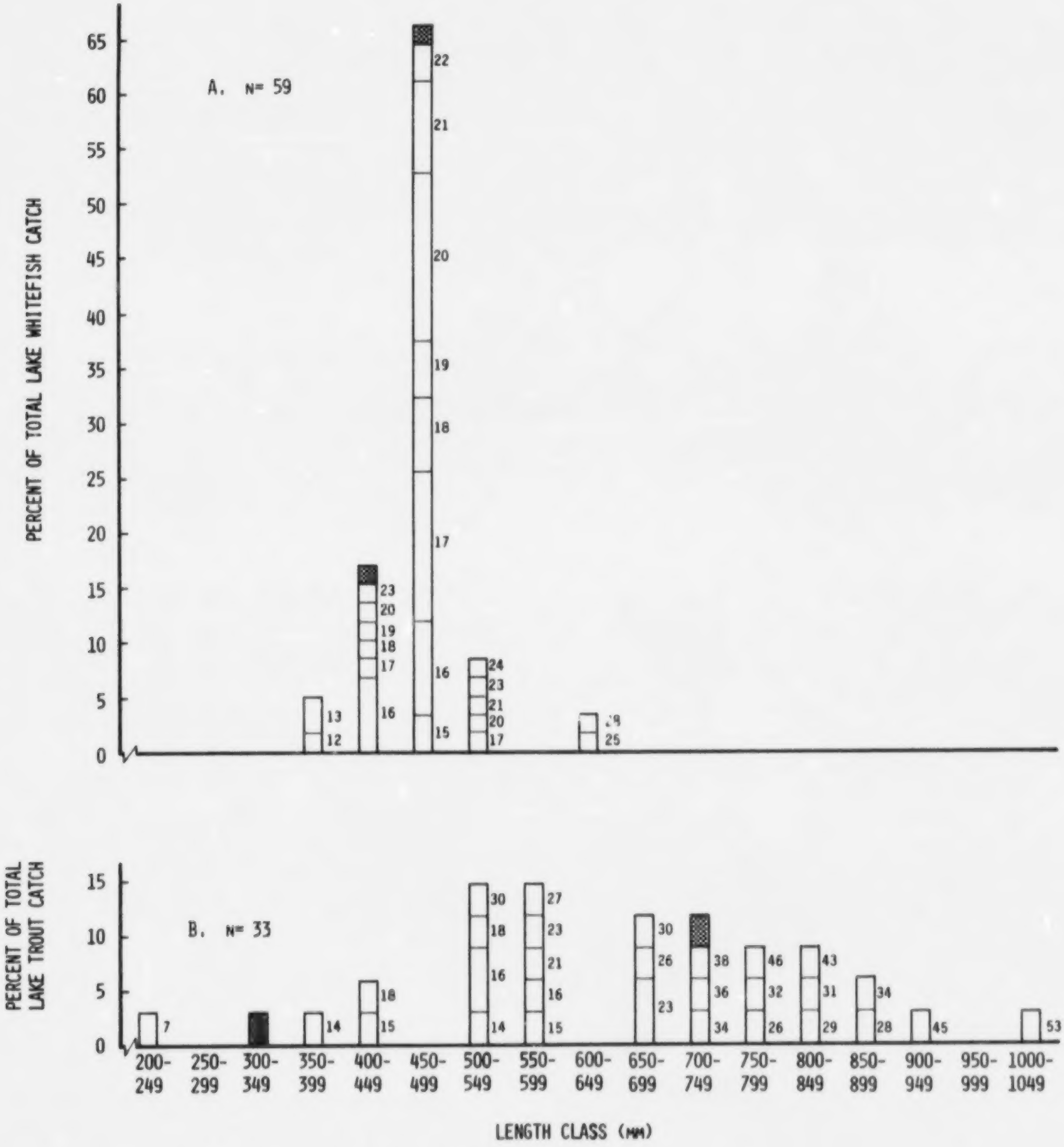

Figure 10. Age-frequency distribution by length class in the catches of a) Arctic charr from lake 9 (69°23'N, 96°38'W) and b) least cisco from lake 6 (69°23'N, 98°26'W) on King William Island. Stippling indicates fish whose ages were not determined.

Individual charr matured between ages 7 and 14 years, at lengths greater than 250 mm, although small precocious males in the landlocked population matured by age 5 years (Table 10). Spawning probably began in early September and continued into October. Individual charr do not appear to spawn annually, since only 15% of the mature charr were entering spawning condition in mid-August.

Charr on King William Island were omnivorous (Table 20). Chironomids formed the bulk of their stomach contents in mid-August, and notostracans and mysids were important where available (Appendix IV). Algae balls *(Nostoc* sp.*)*, fish, trichopterans, amphipods, cladocerans, and copepods were also eaten.

Sixty-five percent of the charr examined on King William Island were hosts to metazoan parasite species (Tables 18 and 21). *Diphyllobothrium dendriticum* and/or *D. ditremum* infected 37% of the fish, *Cystidicola cristivomeri* 33%, *Eubothrium salvelini* 22%, *Salmincola carpionis* 11%, *Echinorhynchus* sp. 10%, and *Bothrimonus sturionis* 1%. Infection levels were generally low to moderate, at less than 200 parasites per host, except in the landlocked lake (site 9) where some fish had between 500 and 1 000 *Cystidicola cristivomeri* in their swimbladders. Although it was not apparent from their stomach contents in August, *Mysis relicta*, the parasite's intermediate host (Eddy and Lankester 1978; Smith and Lankester 1979), must be an important food for fish in that lake at some time during the year. *Bothrimonus sturionis*, a marine parasite, was found in a single charr at site 6, confirming the existence of a searun charr stock in the lake (Dick and Belosevic 1981). Parasites were not found in charr less than 3 years old.

Least cisco caught on King William Island were primarily juveniles and spawning adults (Table 18). Adults and a few juveniles were caught in a large lake (site 6) and young of the year and yearling fish were caught in a small seasonal stream (site 8). Fish between the ages of 3 and 8 years were rare in the lake and the adult fish were heavily parasitized by *Diphyllobothrium ditremum*, a parasite which is normally lost when fish enter salt water (Dick and Belosevic 1981; Fig. 10B). A similar phenomenon was observed in lakes on Prince of Wales Island, where it appears that only fry and spawning fish remain in fresh water during the summer (de March and Eddy 1976; Stewart and Bernier 1982). Fish in the 3 to 8 year classes, and perhaps older non-spawning fish, return from the sea to fresh water immediately before freeze-up, after the upstream migration of Arctic charr is complete (Abrahamson 1964; Stevenson pers. comm.).

Catch per unit of sampling effort (100 m of net set for 24 h) was higher in the lake on King William Island, 61.5 cisco weighing 17.6 kg, than in Crooked Lake on Prince of Wales Island, 6.4 cisco weighing 2.6 kg (Stewart and Bernier 1982). These differences in apparent abundance may be real since the lake is known to be a good fishery (Konagak, Pooloongiak, Pootogoo, and Porter pers. comm.), whereas Crooked Lake has only recently been discovered to contain cisco (Stevenson pers. comm.). Both populations had mean condition factors close to 1.0 but their length-weight relationships were not comparable due to differences in the size ranges of the cisco caught. However, the modal length class for both populations was the same, 300 to 350 mm, and contained a wide age range of fish (Fig. 10B). The apparent bimodality of the distribution may reflect only the time of sampling. Fish appeared to reach near maximum size at about age 9 years and past that age may divert energy from growth to reproduction.

Least cisco older than 6 years and longer than 230 mm were mature (Table 10). The sex ratio was nearly even, unlike Crooked Lake where the majority of the fish caught were male (Stewart and Bernier 1982). Sex ratio differences between the populations may relate to changes in mobility during the spawning period, since these fish were caught prior to spawning, whereas those in Crooked Lake were caught during spawning. Spawning begins in late August and continues into September. Small streams and shallows are important nursery areas for young least cisco.

During mid-August, least cisco on King William Island were eating mainly chironomids, copepods, and algae balls (*Nostoc* sp.; Table 20). Trichopterans, cladocerans, hydracarina, pelecypods, mermithid nematodes, and ostracods were also eaten (Appendix IV).

Diphyllobothrium ditremum and *Proteocephalus exiguus* were the only metazoan parasites found in the least cisco (Tables 18 and 21). They were present in 98% and 40% of the fish respectively, and individual fish hosted up to 200 parasites of each species. Several fish contained nearly 1 000 *P. exiguus* but none contained more than 100 adult forms of the parasite. This suggests that adults were inhibiting the growth and attachment of incoming larvae, causing them to be passed out with the feces.

A single large lake trout was caught in Tasekyoak Lake (Table 18). It was piscivorous and hosted large numbers of *Diphyllobothrium* sp. and *Cystidicola cristivomeri*. It was probably infected with *Diphyllobothrium* sp. by eating smaller infected fish (Henricson 1978) and with *C. cristivomeri* by eating *Mysis relicta* (Eddy and Lankester 1978; Smith and Lankester 1979). It also hosted *Eubothrium salvelini* and *Echinorhynchus* sp.

Ninespine stickleback were caught in three periodic streams on King William Island (Table 18; sites 2, 5, and 8). They are probably important prey of the larger predatory fishes during the winter months when they are unable to shelter in small streams.

BOOTHIA PENINSULA AND NORTHEASTERN KEEWATIN

General Description

This area extends from Wager Bay in the south to southern Boothia Peninsula in the north, and from Committee Bay in the east to Rasmussen Basin in the west (Fig. 1). It is divided into four physiographic areas, namely: Victoria Lowland and Boothia Plain of the Arctic Lowlands physiographic region, and Wager and Boothia plateaus of the Canadian Shield (Fig. 2; Bostock 1970, 1972).

The Victoria Lowland and Boothia Plain areas are formed on flat-lying or little deformed Palaeozoic sedimentary rock composed mainly of limestone and dolomite with lesser amounts of sandstone and shale (Blackadar and Christie 1963; Thorsteinsson and Tozer 1970; Douglas 1973). Most of the area is covered by unconsolidated glacial deposits and elevations are generally less than 100 m asl, but rise to over 200 m asl near the centre of Simpson Peninsula (Fig. 3). Glacial landforms and innumerable lakes dominate the landscape. Local relief is generally less than 50 m and drainage is poor. The Victoria Lowland rises gradually to merge with Boothia Plateau, and a distinct scarp, 120 to 160 m high, separates this lowland from Wager Plateau.

Within the study area, the Wager and Boothia plateaus are composed of deformed Precambrian granitic gneisses, overlain in some areas by Palaeozoic sedimentary rock composed of sandstone, siltstone, shale and conglomerate. Rock fields (felsenmeer) are common on the extensive outcrops of Precambrian bedrock and low-lying areas are mantled by glacial till. On Boothia Plateau, relief is rugged and elevations reach 300 m asl in the north. A number of large lakes dominate the landscape north of Spence Bay and river valleys are generally shallow and poorly defined. Bedrock outcrops create rapids in many of the rivers. Where Boothia and Wager plateaus abut, at Boothis Isthmus, the elevations are about 60 m asl but north of Wager Bay, Wager Plateau rises to elevations of nearly 600 m asl. The surface is deeply dissected, with a well developed drainage system. Rivers are generally silty in the north and clear in the south. The coastal shores of both Boothia and Wager plateaus are bold and rugged (Dunbar and Greenway 1956; Lawrence *et al.* 1977; Wedel 1979).

The entire area was covered by ice during the last Laurentide glaciation (Craig 1964; Andrews 1972; Prest *et al.* 1972; Prest 1973). Glacial ice began retreating from southern Boothia Peninsula about 9 000 years BP and finally melted in the Wager Bay area about 7 000 years ago. Kames, eskers, drumlins, and moraines are common on the plateaus, and eskers and extensive raised beaches are common features of the lowlands. All of Boothia Plain and Victoria Lowland, and most of Boothia Plateau within the study area, were covered by ocean following glaciation. Wager Plateau was submerged below elevations of 200 m above the present sea level in the north and below 120 m elevation in the southeast. Maximum marine submergence was only about 33 m above the present sea level immediately north of Wager Bay, where slow, retreating ice prevented incursion of the sea. The post-glacial rebound ranges from over 200 m in the area's center to about 150 m northeast of Wager Bay.

The climate of southern Boothia Peninsula and northeastern District of Keewatin is generally similar to that of King William Island and Adelaide Peninsula, described previously. One exception is the extent of summer sea-ice clearing, whereby Committee and Lord Mayor bays remain full of second or multi-year sea-ice during August in most years (Maxwell 1981). Other exceptions are mean annual precipitation, which may be higher, and primary wind direction, which varies with location and season (Fletcher and Young 1976). Orographic precipitation has been observed along the west coasts and can cause extreme fluctuations in stream discharges (Sekerak and Graves 1975; Lawrence *et al.* 1977; Lawrence and Davies 1978; Wedel 1979). High late-summer runoffs are common in the Hayes and Murchison rivers.

Vegetation cover in this area is nearly continuous except on bedrock outcrops (Porsild 1957, 1964; Lawrence *et al.* 1977; Porsild and Cody 1980; Thompson 1980). Sedge and moss meadows are found in poorly drained lowland areas of both Boothia Peninsula and northern Keewatin. They tend to be larger with a higher proportion of sedges towards the south. On Boothia Peninsula the better drained lowland areas are dominated by willows, sedges and mosses. In northern Keewatin, these 'willow hummocks' persist further upslope because of the greater soil moisture content. Lichens are found on dry plateaus throughout the area and on exposed uplands in northern Keewatin. Mountain avens, a pronounced calcifile, inhabits the limestone plateaus of Boothia Peninsula but is replaced by heaths on the plateaus south of Shepherd Bay, where limestone is lost from the soil. Flat areas of Boothia Peninsula which are wet following snowmelt and become progressively drier generally support saxifrages, Arctic poppies *(Papaver radicatum)*, and grasses. Seepage slopes are vegetated by patina, mosses and forbs. Wet rocky areas are often moss covered.

Barren ground caribou *(Rangifer tarandus groenlandicus)*, are common throughout much of this area and have been studied in conjunction with proposed gas pipeline developments (Thompson and Fischer 1980; Thompson and Everson 1982). During the survey Arctic wolves *(Canis lupus* ssp.) were sighted near the Hayes River and a polar bear *(Ursus maritimus)* was seen walking the shore of Walker Lake (Fig 11).

Since Polar Gas proposed the construction of a natural gas pipeline along the area's north-south axis, there have been a variety of environmental assessment studies conducted (eg. Lawrence *et al.* 1977; Wedel 1979; Thompson 1980).

There are two communities, Spence Bay and Pelly Bay, and several D.E.W. line sites in this area (Fig. 1). Spence Bay (69°32'N, 93°31'W) is located on the west side of Boothia Isthmus, straddling the boundary between the districts of Franklin and Keewatin. It was established in 1947 when the Hudson's Bay Company closed their trading post at Fort Ross because

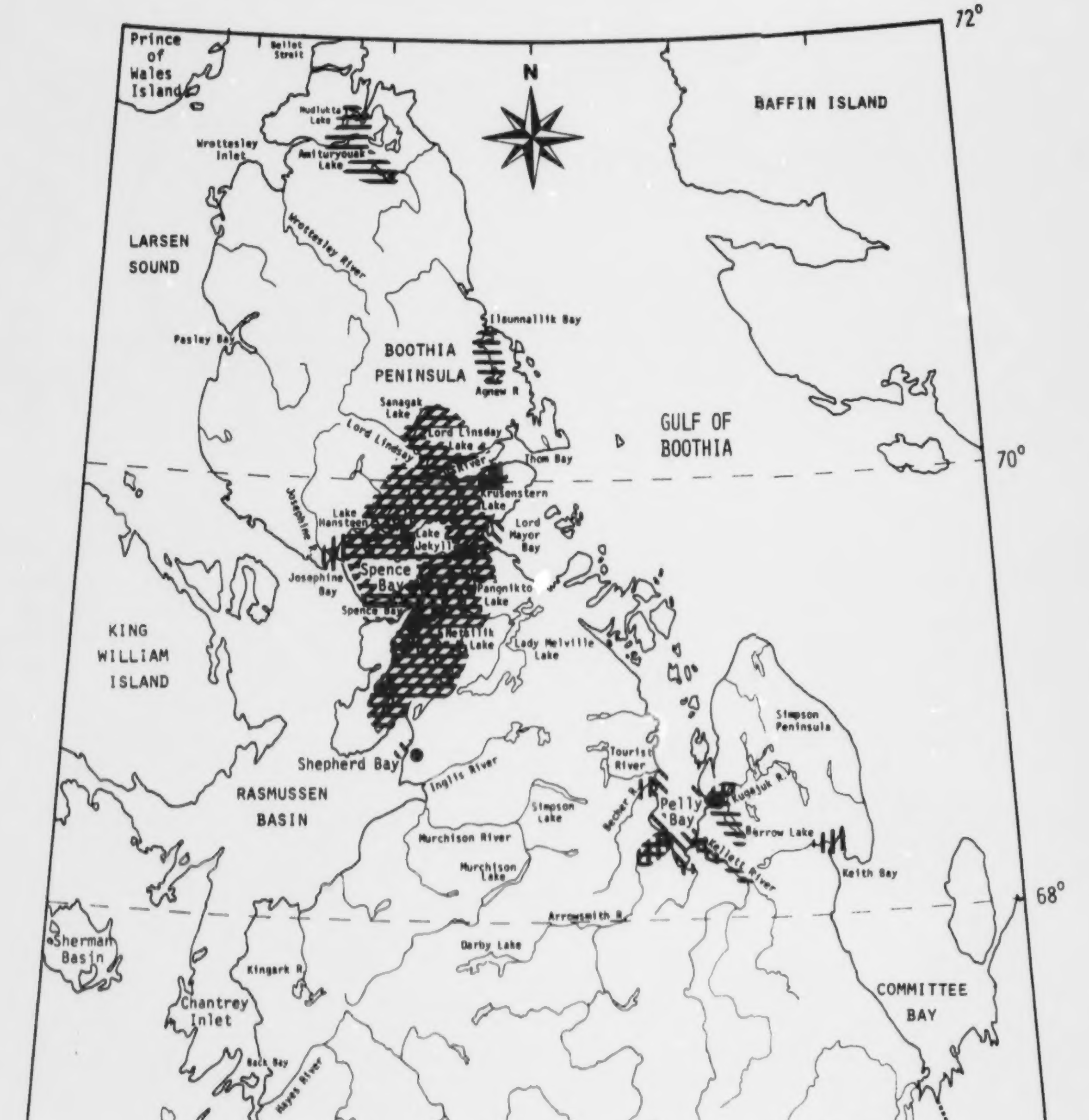
Prince of Wales Island
Bellot Strait
Mudlukta Lake
Amituryouak Lake
Wrottesley Inlet
N
BAFFIN ISLAND
LARSEN SOUND
Wrottesley River
Ilsunnallik Bay
Pasley Bay
BOOTHIA PENINSULA
Agnew R
Sanagak Lake
Lord Lindsay Lake
Lord Lindsay River
Thom Bay
GULF OF BOOTHIA
Josephine R.
Lake Hansteen
Krusenstern Lake
Lord Mayor Bay
Lake Jekyll
Josephine Bay
Spence Bay
Pangnikto Lake
Netsilik Lake
Lady Melville Lake
KING WILLIAM ISLAND
Simpson Peninsula
Shepherd Bay
Tourist River
Inglis River
RASMUSSEN BASIN
Simpson Lake
Becher R.
Pelly Bay
Kugajuk R.
Barrow Lake
Murchison River
Murchison Lake
Kellett River
Keith Bay
Arrowsmith R.
Darby Lake
Sherman Basin
Kingark R.
Chantrey Inlet
COMMITTEE BAY
Back Bay
Hayes River
Franklin Lake
DISTRICT OF KEEWATIN
Curtis Lake
Stewart Lake
Walker Lake
0
100
KILOMETERS
Laughland Lake
Snowbank River
Ford Lake
Brown Lake
Quoich River
Wager Bay
72°
70°
68°
66°
98°
96°
94°
92°
90°
88°
86°

Figure 11. Domestic fishing areas in the northeastern District of Keewatin which are fished by residents of Spence and Pelly bays between March and June ▨ , during July and August ▧ , August and September ▥, or between October and December ▤ .

severe ice conditions prevented its resupply. The people, many of them originally from Cape Dorset and Pond Inlet, then moved south to Spence Bay. By 1969, most of the families who lived along the Boothia coasts had settled permanently in Spence Bay. Today, the community has a population of 465 persons and hunting, trapping, and fishing remain important activities. A thriving handicrafts and garment industry has developed. Pelly Bay (68° 32'N, 89°48'W) is located on the Keewatin mainland at the east shore of Pelly Bay. The community was founded by a Roman Catholic missionary in 1935. The Roman Catholic church, built of locally quarried stone, forms the nucleus of the settlement of 246 people. Today, the community is known for its fine ivory carvings though hunting, trapping, and fishing are still important livelihoods for the residents (Brice-Bennett 1976; Lyall 1979; Government of the Northwest Territories 1982). There is a D.E.W. line site near the community and another at Shepherd Bay, south of Spence Bay. They were established in 1957 and provide some employment for the local Inuit.

Domestic, Commercial and Sport Fishing

Spence Bay

Fish, particularly anadromous (searun) Arctic charr, are an important food for residents of Spence Bay. Between March and December, fishermen from the community range south to Shepherd Bay (69°00'N, 93°50'W) and north to the lakes near Bellot Strait (eg. 71°47'N, 94°50'W; Fig. 11; Brice-Bennett 1976; Ikkuisiliuq, Jacobson, and Orr pers. comm.). Traveling to the fishing areas by snowmobile in the spring and fall, or by boat in the summer, they net, jig, spear or angle Arctic charr, lake trout, lake whitefish, cod, and cisco. Most fish are caught by Inuit domestic fishermen who use them to feed their families. From March to June and October to December, fish are netted or jigged through the ice of freshwater lakes and marine bays (Brice-Bennett 1976; Ikkuisiliuq, Jacobson, and Orr pers. comm.). Landlocked Arctic charr and lake trout are caught in Pangnikto, Jekyll, Kangikjuke (69°50'N, 93°48'W), Ishluktuk (69°41'N, 94°10'W), Redfish (69° 31'N, 93°45'W), and Hansteen lakes; anadromous Arctic charr, lake trout, cisco, and lake whitefish are caught in Netsilik Lake; and Arctic charr and lake trout, possibly anadromous, are caught in Middle (69°38'N, 93°15'W), and Krusenstern lakes and the lakes east of Balfour Bay (eg. 69°08'N, 94°00'W). During this period, cod are jigged through the ice of Spence Bay and Willersted Inlet (69°15'N, 93°45'W). During July and August, nets are set along the shores of Netsiksiuvik Inlet, in Lord Mayor Bay, to catch Arctic charr and cod. Arctic charr and lake trout are angled and sometimes netted, usually from shore, at summer camps and near the community. In late August and early September, anadromous Arctic charr are netted or speared in the rivers as they return upstream to overwinter in fresh water. The outlet streams to Hansteen, Netsilik, Middle, and Krusenstern lakes are netted annually and charr are speared at saputits on the outlets to Krusenstern Lake and Lake Hansteen.

Commercial fishermen from Spence Bay net Arctic charr in Lord Lindsay Lake (70°10'N, 92°25'W), Netsilik Lake, and the Agnew River area (70°40'N, 92°40'W) during October and November (Table 11, Fig. 12). Lord Lindsay Lake has been fished annually since 1977 and has an anadromous charr quota of 3 000 kg (round weight; Manual of Fisheries Acts and Regulations 1982; Yaremchuk pers. comm.). Netsilik Lake was last commercially fished in 1978 and there are no catch statistics available for the Agnew River area which has a charr quota of 4 500 kg (round weight). In 1981, commercial test fishing permits were issued for Netsilik, Lady Melville, and Pangnikto lakes. Further data is not available.

Pelly Bay

Fish are an important food for Pelly Bay residents. They fish primarily for anadromous (searun) Arctic charr and secondarily for anadromous lake trout, Arctic cisco and lake whitefish, and landlocked charr and trout (Brice-Bennett 1976; Dickie, Ikkuisiliuq, Orr, and Peet pers. comm.). During July and August, anadromous Arctic charr are netted along the Pelly Bay coast near mouths of the larger rivers and offshore the community. Cod and sculpin caught incidentally are seldom utilized. In September, charr returning to fresh water are netted at the Kellett, Becher, Arrowsmith, and Kugajuk river mouths and speared at a saputit located near the mouth of the Kugajuk River. Spear fishing is both recreational and productive. The Arrowsmith and Kellett rivers are netted between October and January and both Barrow Lake and the mouth of the Kugajuk River are netted through the winter ice. Winterkill is common in isolated pools of the Kellett River and in small headwater lakes of the Kugajuk River.

Since the early 1970's, commercial fishermen from Pelly Bay have fished the Kellett, Becher, and Arrowsmith rivers and an unnamed river which flows into Keith Bay (Table 11; Kristofferson *et al.* 1982). Anadromous Arctic charr are the main species taken. They are netted along the shores of Pelly Bay in July and August, as they run into the rivers in September, and through the river ice in October. Lake trout, Arctic cisco, and lake whitefish are caught incidentally and used for domestic consumption. In 1979 and 1980, test fisheries were conducted at the river mouths to assess the economic feasibility of establishing fish processing plants in Gjoa Haven and Pelly Bay. The Tourist River, where visitors to Pelly Bay are taken for sport fishing, was also tested.

Test results showed that the Keith Bay charr population is being moderately exploited and that the Tourist, Becher, Arrowsmith, and Kellett river charr stocks have been heavily exploited (Kristofferson *et al.* 1982). Fish managers have recommended that the present charr quota of 4 500 kg (round weight) remain in effect at Keith Bay and that the other rivers be closed to all fishing until stocks recover.

Inuit residents of the D.E.W. line site at Shepherd Bay net Arctic charr, lake trout, Arctic cisco, and Greenland cod *(Gadus ogac)* along the

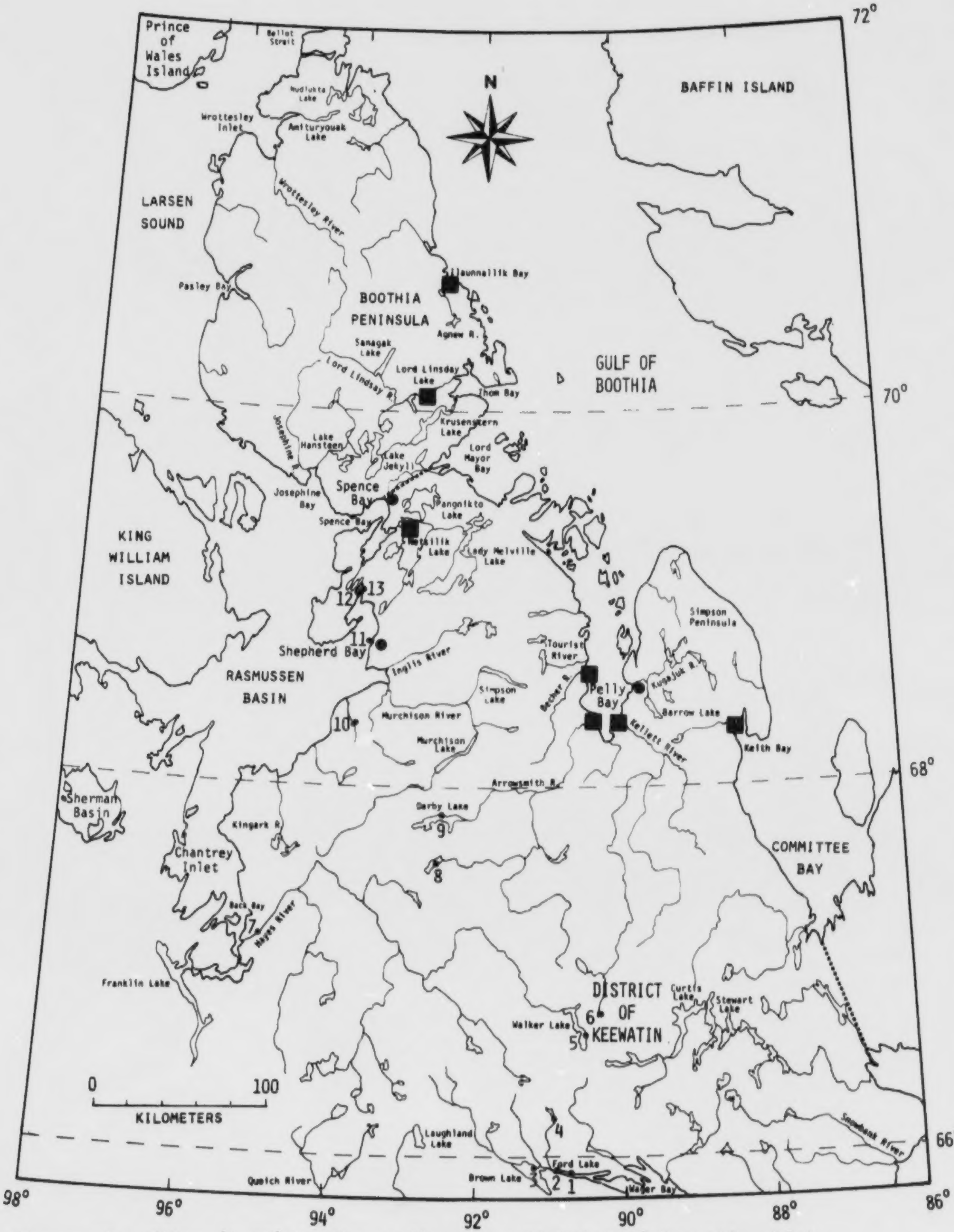
72°
Prince of Wales Island
Bellot Strait
Nudlukta Lake
Wrottesley Inlet
Amituryouak Lake
N
BAFFIN ISLAND
LARSEN SOUND
Wrottesley River
Pasley Bay
Ilaunnalik Bay
BOOTHIA PENINSULA
Agnew R.
Sanagak Lake
Lord Lindsay R.
Lord Linsday Lake
GULF OF BOOTHIA
Thom Bay
70°
Josephine R.
Krusenstern Lake
Lake Hansteen
Lake Jekyll
Lord Mayor Bay
Josephine Bay
Spence Bay
Pangnikto Lake
Spence Bay
KING WILLIAM ISLAND
Netsilik Lake
Lady Melville Lake
12
13
Simpson Peninsula
11
Shepherd Bay
Tourist River
RASMUSSEN BASIN
Inglis River
Simpson Lake
Becher R.
Pelly Bay
Kugajuk R.
Barrow Lake
10
Murchison River
Murchison Lake
Kellett River
Keith Bay
68°
Arrowsmith R.
Sherman Basin
Darby Lake
9
Kingark R.
Chantrey Inlet
COMMITTEE BAY
8
Back Bay
7
Hayes River
Franklin Lake
DISTRICT OF KEEWATIN
Curtis Lake
Stewart Lake
6
Walker Lake
5
0
100
KILOMETERS
4
Laughland Lake
Snowbank River
66°
Ford Lake
Quoich River
Brown Lake
2
1
Wager Bay
98°
96°
94°
92°
90°
88°
86°

Figure 12. Sites (1-13) in the northeastern District of Keewatin which were sampled during the 1982 survey, or (■) where commercial fishermen from Spence and Pelly bays harvest anadromous (searun) Arctic charr.

Table 11. Sites fished by, and 1982 production of, commercial fisheries for anadromous (searun) Arctic charr in the vicinities of Spence and Pelly bays (Kristofferson *et al.* 1982; Kristofferson and Yaremchuk pers. comm.).

Waters	Coordinates	Years Fished	1982 Catch Quota (kg Round Weight)	1982 Production (kg Round Weight)
Spence Bay				
Lord Lindsay Lake	70°10'N, 92°25'W	1974, 1977-82	3 000	2 840[2]
Netsilik Lake	69°15'N, 93°05'W	1978	-	-
Agnew River (Ilaunnallik Bay)	70°40'N, 92°40'W	1977, 1982	4 500	?[1]
Pelly Bay				
Arrowsmith River	68°23'N, 90°17'W	1971-75, 1977-80	-	-
Becher River	68°45'N, 90°08'W	1972-1980	-	-
Kellett River	68°21'N, 90°07'W	1970-75, 1977-79	-	-
Keith Bay	68°15'N, 88°18'W	1973, 1974, 1977, 1979, 1980, 1982	4 500	?[1]

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[1] quota opened for fishing in 1982 but production is unknown.

[2] 1981 production.

coast of Shepherd Bay, near Wilkins Point, between July and September. The fish are eaten or used for dog food (Agnavigak pers. comm.).

Previous Research

Lakes and rivers on Boothia Peninsula and in the northeastern District of Keewatin have been studied to assess the possible impact of gas pipeline development on aquatic ecosystems, and to assess the commercial fishing potential of the major rivers.

Between 1974 and 1978, three separate aquatic resource surveys were conducted along the proposed Polar Gas pipeline route which would connect natural gas wells in the high Arctic with southern markets (Appendix II). Sekerak and Graves (1975) travelled the length of Boothia Peninsula and caught Arctic charr in Nudlukta, Amituryouak, Sanagak, and Jekyll lakes; in the Wrottesley and Lord Lindsay river systems; and in unnamed rivers flowing into the north arm of Pasley Bay, Brentford Bay, and the Gulf of Boothia. They also caught lake trout in the Lord Lindsay River system and ninespine stickleback in Jekyll Lake. Hatfield *et al.* (1977, 1978) caught Arctic charr, lake trout, and lake whitefish in the Hayes, Murchison, and Inglis rivers, and in Netsilik Lake; round whitefish in the Hayes and Murchison rivers; least and Arctic cisco in the Inglis river; and cisco and ninespine stickleback in Netsilik Lake and the Murchison River. A small lake near Lord Mayor Bay (69°44'N, 92°47'W) contained Arctic charr and lake trout and there were Arctic charr in an unnamed lake (69°55'N, 92°32'W) and lake trout in Lord Lindsay Lake. Lawrence *et al.* (1978) caught Arctic charr, lake trout, lake and round whitefish, and least and Arctic cisco in the Murchison River system, principally in Murchison and Simpson lakes. They also caught lake trout and Arctic charr in the Lord Lindsay River system and Arctic charr in Amituryouak Lake.

Many of the larger rivers in this area have been sampled to determine whether they support commercially exploitable anadromous Arctic charr populations. Kristofferson *et al.* (1982) caught Arctic charr in the mouths of the Back, Hayes, Kingark, Murchison, Arrowsmith, Tourist, Becher, and Kellet rivers and in an unnamed river which flows into Keith Bay. Stefansson and Kostiuk (1975) caught Arctic charr and lake trout in Barrow Lake and in four unnamed lakes near Pelly Bay (68°15'N, 89°05'W; 68°43'N, 91°10'W; 68°22'N, 89°43'W; 68°21'N, 89°40'W); lake trout in Simpson Lake, Ballenden Lake, and two unnamed lakes (68°28'N, 89°22'W; 68°15'N, 89°41'W); and Arctic cisco in one unnamed lake (68°15'N, 89°05'W). Peet (pers. comm.) caught Arctic charr, lake trout, Arctic cisco, and fourhorn sculpin at the mouths of the Arrowsmith and Kellet rivers and lake whitefish at the mouth of the Arrowsmith river. He also caught Arctic charr, fourhorn sculpin, and cod at the mouth of Kugajuk River. Orr (pers. comm.) caught an adult male Arctic grayling along the east coast of Chantrey Inlet.

During previous Northern Land Use Information Series surveys, MacDonald and Stewart (1980) caught Arctic charr, lake trout, round whitefish, Arctic grayling, and slimy sculpin in the Quoich River. They also reported lake trout, lake and round whitefish, lake and Arctic cisco, Arctic grayling, ninespine stickleback, and slimy sculpin from Franklin Lake, near the mouth of the Back River.

The potential effects of stream blockages; sediment, sewage, and hydrocarbon additions to the water column; water and gravel removal; and increased fishing pressure were discussed by Lawrence *et al.* (1977). These hazards to living aquatic organisms can all be caused by improper development. Hydrological concerns in this area were discussed by Wedel (1979).

Distributions of marine fishes that have been caught in waters adjoining Boothia Peninsula and the northeastern District of Keewatin are summarized in Appendix I.

Survey Results and Discussion

Chemistry

Lakes sampled in the northeastern District of Keewatin were oligotrophic and probably cold monomictic (Table 12). Situated on the shield rock of Wager Plateau or the sedimentary glacial drift of Victoria Lowland, they form two chemically distinct groups. Waters of the plateau lakes are acidic and ultra-oligotrophic (sites 4, 5 and 9). They have extremely low ion concentrations, and thereby low conductivities, with generally low dissolved and particulate carbon, nitrogen, and phosphorus concentrations and low chlorophyll A levels. Waters of the lowland lakes are near neutral with sodium and chloride being the major ions contributing to their conductivities; conductivities are similar to those found in a low-lying coastal lake on southwestern Victoria Island (sites 10 and 12). Lowland lakes sampled in both areas had high dissolved phosphorus and nutrient concentrations, probably reflecting the composition of unconsolidated surface soils which were being eroded by wind and wave action into the lakes.

Zooplankton

Copepodid stages of *Diaptomus minutus* and *Cyclops scutifer* dominated the zooplankton catches in lakes on Wager Plateau (Table 13). All three lakes contained *Daphnia longiremis* and *Chydorus sphaericus* and individual lakes contained *Daphnia longispina microcephala* or *Bosmina longirostris*. Coastal lakes were dominated by adult *Diaptomus pribilofensis* and also contained *Eurytemora canadensis* and *Bosmina longirostris*. *Cyclops scutifer* and *Daphnia pulex* were present in large numbers in one lake (site 12). Notably absent from these August samples were *Limnocalanus macrurus* and *Diaptomus sicilis*, species found on King William Island and further west in the District of Keewatin (Table 22, Appendix IV; MacDonald and Stewart 1980; Patalas pers. comm.). Rotifers were present in low numbers in the

Table 12. Water chemistry data (means of n samples) for five northeastern Keewatin lakes.

Sampling Site (Fig. 12)	4	5	9	10	12
Coordinates	66°10.5'N, 90°56.5'W	66°41'N, 90°31'W	67°50'N, 92°32'W	68°23'N, 93°46'W	69°01.5'N, 93°48'W
Date	20/8/82	22/8/82	23/8/82	24/8/82	24/8/82
Field Data					
Surface water temperature (°C)	10.0	8.0	6.7	4.5	4.5
Depth (m)	8	9	6	3	1.8
Time of day (h)	1300	1700	1645	1415	1430
Light conditions, wind	clear, windy	overcast, snow	overcast, v. windy	broken cloud, windy	broken cloud, windy
Secchi depth (m)	>8	8	>6	0.05	1.3
Secchi color	pale blue	pale blue-green	pale green	gray brown	pale green
Laboratory Data					
Number of samples (n)	2	2	2	2	2
pH	5.74	5.43	5.31	6.73	7.47
Conductivity at 25°C (μS/cm)	<10	<10	<10	210	470
Total dissolved nitrogen (μg/L)	120	135	90	225	375
Total dissolved phosphorus (μg/L)	4	5	4	70	14
Nutrients (μg/L)					
Suspended nitrogen	48.5	36	27	226	108
Suspended phosphorus	5	2	<1	138	12
Suspended carbon	534	426	290	1753	777
Chlorophyll A	0.4	0.3	0.2	2.7	0.5
Major Ions (mg/L)					
Sodium	0.69	0.32	0.40	30.2	56.8
Potassium	0.23	0.12	0.12	3.22	1.98
Calcium	0.57	0.34	0.42	5.49	20.8
Magnesium	0.20	0.20	0.13	6.70	15.7
Chloride	0.5	1.0	0.5	54.0	114.0
Sulphate	0.8	0.4	0.4	2.0	3.8

Table 13. Zooplankton species and their abundance (mean number of individuals per litre) in five lakes in the northeastern District of Keewatin.

Sampling Site (Fig. 12)	4	5	9	10	12
Date	20/8/82	22/8/82	23/8/82	24/8/82	24/8/82
Depth (m)	8.0	9.0	6.0	surface	1.5
Number of Samples	2	2	2	2	2
Ph. Arthropoda					
Cl. Crustacea					
Sub Cl. Copepoda					
O. Calanoida					
Eurytemora canadensis				(11.1)[1]	0.06
Diaptomus minutus	0.36	0.09	0.03		
copepodids	3.05	1.04	0.13		
Diaptomus pribilofensis				(44.5)	19.4
copepodids					1.33
Diaptomidae nauplii	0.15	0.09	0.48	(22.2)	
O. Cyclopoida					
Cyclops scutifer	0.12	0.77	1.63		0.26
copepodids	1.45	5.84	12.9		2.07
Cyclopidae nauplii	0.32	1.31	1.63		18.5
Sub Cl. Branchiopoda					
O. Cladocera					
Holopedium gibberum	0.04	0.03	1.83		
Daphnia longiremis	0.66	0.22	0.02		
Daphnia longispina x microcephala			0.02		
Daphnia pulex					16.5
Bosmina longirostris	0.07			(22.2)	0.53
Eubosmina longispina		0.04	0.01		
Chydorus sphaericus	0.03		0.01		
Total ind/L	6.25	9.43	18.7	(10C)	58.6
Number of Species	6	5	7	3	5
Ph. Rotifera	5	20	21	p[2]	372

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[1] numbers in brackets indicate percent of the total catch for species caught in non-quantitative surface hauls.

[2] rotifers present.

plateau lakes and were more abundant in the coastal lakes.

Fish

Arctic charr, lake trout, least cisco, and ninespine stickleback were caught in the northeastern District of Keewatin during the survey (Table 19; Appendix III; Figure 12). Lake trout and Arctic charr were the most common and numerous species, while least cisco and ninespine stickleback were only caught in one shallow coastal lake (site 10). Arctic charr, lake trout, Arctic cisco, lake whitefish, and burbot were caught just outside the study area in the Hayes River (site 7). Arctic charr and Arctic cisco were also caught in the ocean at Shepherd Bay (site 11).

Arctic charr and lake trout occur in drainages throughout the northeastern District of Keewatin and Boothia Peninsula (Appendix II). Arctic cisco and lake whitefish are found in drainages south and on both sides of Boothia Isthmus, while least cisco, round whitefish, burbot, and ninespine stickleback have only been caught on the west side. Falls and rapids appear to limit the inland distributions of these species and they may be absent from headwater lakes of the Arrowsmith and Hayes rivers on Wager Plateau. Arctic charr, lake trout, Arctic cisco, and lake whitefish all feed in the coastal marine waters of Rasmussen Basin, Chantrey Inlet, and Committee Bay. Lake cisco have been reported from Simpson Lake (Lawrence unpubl. data) and least cisco, Arctic grayling, and slimy sculpin have been caught immediately southwest of the study area in the Back River (MacDonald and Stewart 1980).

Landlocked or lake-dwelling charr were caught in five isolated lakes on the Wager Plateau (Table 19; sites 4-6, 8, and 9). They were small, slow growing, and few in number. Less than 12 fish or 4 kg of fish were caught per 100 m of net set for a 24 h period (Table 14). Mature male charr between 4 and 7 years old and 96 to 110 mm long were caught in four of these lakes (sites 4, 6, 8, and 9; Table 15). Dwarf or precocious males are common in charr populations in the Arctic (Johnson 1980). Less common was the occurrence in three lakes of mature female charr, 96 to 110 mm long and between 7 and 11 years old (sites 6, 8, and 9). Dwarf female charr in this size range have also been caught in ultraoligotrophic lakes in northern Labrador (Martin 1955), in the upland lakes on the Murchison River system (Lawrence unpubl. data), and on Devon Island (Stewart and MacDonald 1981). In late August, many of these dwarf fish were preparing to spawn and females contained from 49 to 65 ripe eggs, 3.3 to 4.5 mm in diameter. Gonads made up between 12 and 14% of the total body weight in females and between 1 and 4% of the total body weight in males. Normal sized charr were caught in two lakes (sites 4 and 5). In late August, they were eating chironomids, tipulids, and copepods and both dwarf and normal charr hosted small numbers of metazoan parasites (Tables 20 and 21). *Diphyllobothrium ditremum* and *Philonema agubernaculum* parasitized both groups of charr but *Eubothrium salvelini* were found only in normal charr.

Table 14. Summary of age, length, and weight data for fish from northeastern Keewatin and adjacent coastal marine waters.

Sampling Location		N	Length (mm)		Weight (g)		Condition Factor[1]		Length-Weight Relationship[2]				Age (y)		
Site # (Fig. 12)	Coordinates		Mean (Range)	S.D.[4]	Mean (Range)	S.D.	Mean	S.D.	y intercept (log a)	slope (b)	S.D. of b	r^2	n	Mean (Range)	S.D.
Arctic charr															
4	66°10.5'N, 90°56'W	7	320 (101-530)	188	643 (9-1500)	712	0.987	0.077					7	10.4 (4-17)	6.4
6	66°45'N, 90°19'W	7	150 (90-480)	146	192 (8-1290)	484	1.069	0.094					7	8.0 (5-13)	2.8
7[3]	67°0[illegible]'N, 95°04'W	202	644 (505-833)	65	3501 (1210-9120)	1168	1.276	0.165	-4.773	2.956	0.0896	0.845	169	12.6 (10-25)	2.1
9	67°50'N, 92°32'W	5	106 (103-110)	3	13 (12-14)	1	1.102	0.047					5	6.2 (4-11)	2.8
lake trout															
3	65°56'N, 91°05'W	20	389 (134-607)	134	776 (22-2550)	646	0.992	0.144	-5.056	3.019	0.074	0.989	20	19.4 (5-41)	10.0
4	66°10.5'N, 90°58'W	11	301 (102-485)	127	380 (9-980)	321	0.971	0.106	-5.036	3.009	0.068	0.995	11	12.6 (3-26)	7.4
5	66°41'N, 90°31'W	7	415 (298-475)	55	743 (260-900)	225	1.004	0.090					7	26.4 (12-31)	6.6
6	66°45'N, 90°19'W	7	432 (318-549)	69	936 (380-1900)	499	1.075	0.139					7	19.3 (13-25)	4.1
7[3]	67°09'N, 95°04'W	34	650 (213-1024)	182	3449 (95-10240)	2509	1.012	0.120	-5.289	3.104	0.065	0.986	31	26.7 (7-53)	11.0
8	67°36'N, 92°33'W	6	380 (102-706)	196	771 (10-2500)	886	0.964	0.146					6	15.8 (3-31)	9.0
9	67°50'N, 92°32'W	17	394 (10[illegible]-904)	173	915 (10-4650)	1100	1.066	0.156	-4.842	2.947	0.093	0.985	17	16.9 (2-40)	8.4
lake whitefish															
7[3]	67°09'N, 95°04'W	59	467 (378-642)	41	1507 (730-5060)	639	1.422	0.134	-6.156	3.49	0.131	0.926	57	18.6 (12-28)	3.0
Arctic cisco															
7[3]	67°09'N, 95°04'W	23	436 (370-498)	32	1137 (750-1740)	329	1.334	0.132	-6.582	3.646	0.263	0.902	23	15.7 (12-21)	2.0
fourhorn sculpin															
11	68°48'N, 93°38'W	45	256 (210-302)	20	164 (82-260)	42	0.960	0.095	-5.391	3.154	0.177	0.880	-	-	-
shorthorn sculpin															
2	65°55'N, 90°54'W	39	272 (133-376)	50	279 (26-650)	133	1.262	0.112	-5.250	3.144	0.062	0.986	-	-	-

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[1] Condition Factor = weight in g·(fork length in mm)$^{-3}$·10^5

[2] log weight in g = b·log length in mm + log a

[3] These fish were caught using 70 mm mesh (bar measure) gillnets, not standard gangs.

[4] S.D. = standard deviation from the mean ($\bar{x}$).

Table 15. Summary of sexual maturity data for fish from northeastern Keewatin and adjacent coastal marine waters.

Site # (Fig. 12)	Date	N	Sex	Maturity							Age of youngest mature fish (y)	Length of youngest mature fish (mm)
				Immature	Mature	Near Ripe	Ripe	Ripe & Running	Spent	Unknown		
Arctic charr												
4	20/8/82	5	Male	1		2	2				4	101
		2	Female		1		1				9	252
		5	Total	1	1	2	1					
6	22/8/82	4	Male.		1	3					5	90
		3	Female		1	1	1				9	93
		7	Total		2	4	1					
7[1]	2-8/8/82	101	Male		100	1					10	574
		100	Female		98	2					10	561
		201	Total		198	3						
9	23/8/82	3	Male			3					4	107
		2	Female	1		1					11	110
		5	Total	1		4						
lake trout												
3	20/8/82	15	Male	6	2	7					12	331
		5	Female	1	2	2					13	389
		20	Total	7	4	9						
4	20/8/82	8	Male	2	4	2					12	319
		3	Female	3								
		11	Total	5	4	2						
5	22/8/82	3	Male	1	1	1					27	435
		4	Female		3		1				26	437
		7	Total	1	4	1	1					
6	22/8/82	4	Male	2	1	1					23	440
		3	Female		2	1					16	402
		7	Total	2	3	2						
7[1]	2-8/9/82	15	Male	1	9	3	2				14	398
		18	Female	2	16						16	572
		33	Total	3	25	3	5					
8	23/8/82	4	Male	1	3						14	373
		2	Female	2								
		6	Total	3	3							
9	23/8/82	10	Male	2	2	6					14	316
		7	Female	3	2	1	1				15	347
		17	Total	5	4	7	1					
lake whitefish												
7[1]	2-8/9/82	27	Male		25	2					12	382
		31	Female		20	11					13	378
		58	Total		45	13						
Arctic cisco												
7[1]	2-8/9/82	12	Male			11	1				12	414
		7	Female			1	6				15	451
		19	Total			12	7					
fourhorn sculpin												
11	25/8/82	12	Male			12					-	210
		33	Female		14	19					-	215
		45	Total		14	31						
shorthorn sculpin												
2	22/8/82	13	Male			13					-	217
		24	Female	1	2	21					-	226
		39	Total	1	2	34				2		

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[1] 70 mm mesh (bar measure) gillnets were used to catch these fish, not standard gangs.

[2] length of smallest mature fish. No age determinations were made on sculpins.

A single large Arctic charr was caught in Brown Lake (Table 19, site 3). It was preparing to spawn in the fall and was parasitized by small numbers of *Eubothrium salvelini, Philonema agubernaculum, Salmincola edwardsii* and *S. carpionis*. Large numbers of another metazoan parasite, *Cystidicola cristivomeri*, were found in the swimbladder. To be infected by the parasite in large numbers, the fish must have spent the summer in fresh water and eaten many *Mysis relicta*. During non-spawning years, the fish may have gone to sea since the lake is known to have an anadromous population (Welch pers. comm.).

Anadromous Arctic charr were caught in Shepherd Bay and the Hayes River (Table 19, sites 7 and 11). The Shepherd Bay fish were itinerants, feeding at sea during the summer, and the Hayes River fish were returning to fresh water after a summer spent feeding in Back Bay. They were larger and grew faster than the landlocked and lake-dwelling fish and were in excellent condition (mean condition >1.27; Table 14). The Shepherd Bay fish, a male aged 7 years and a female aged 12 years were mature non-spawners. The female had eaten cod and was parasitized by *Bothrimonus sturionis, Thynnascaris adunca*, and *Echinorhynchus* sp. (Tables 20 and 21).

Charr in the Hayes River were caught using 70 mm mesh commercial gillnets, not the mixed mesh gangs used elsewhere during the survey (Plate 7). Catch per unit effort increased abruptly from 4 September until 11 September, when the fishery was closed, suggesting that there was a run of anadromous charr in the river. Catch data were very similar to those collected in the past from the Back River and there is a possibility that the Arctic charr stock using the Back is the same one that uses the Hayes (Kristofferson pers. comm.). Because large mesh nets were used, only a narrow size range of fish were caught and the length-weight relationship and length-frequency distribution should not be compared with results from other catches where mixed mesh nets were used (Table 14, Figure 13B). The figures serve to illustrate the large size and the fast and variable growth rates of fish in the population. The stock is not now being heavily exploited but has been fished in the past by residents of Gjoa Haven (Tiriganeak pers. comm.). Data collected suggest that the Hayes River charr stock can withstand increased exploitation, but the optimum level of exploitation remains to be determined (Kristofferson pers. comm.).

All of the fish caught in the Hayes River were mature, but less than 2% were entering spawning condition in early September, suggesting that spawning fish had either preceeded the run, remained in fresh water during the summer, or were using a different river system (Table 15). The youngest fish caught were 10 years old and mature, sex ratios were even, and individual fish did not appear to spawn annually.

Seventy-two percent of charr caught in the Hayes River had recently eaten polar cod *(Arctogadus glacialis)* and 95% hosted metazoan parasites (Tables 19 and 21). *Bothrimonus sturionis* infected 73% of the charr, *Echinorhynchus* sp. 43%, *Salmincola carpionis* 37%, *Diphyllobothrium* sp. 22%,

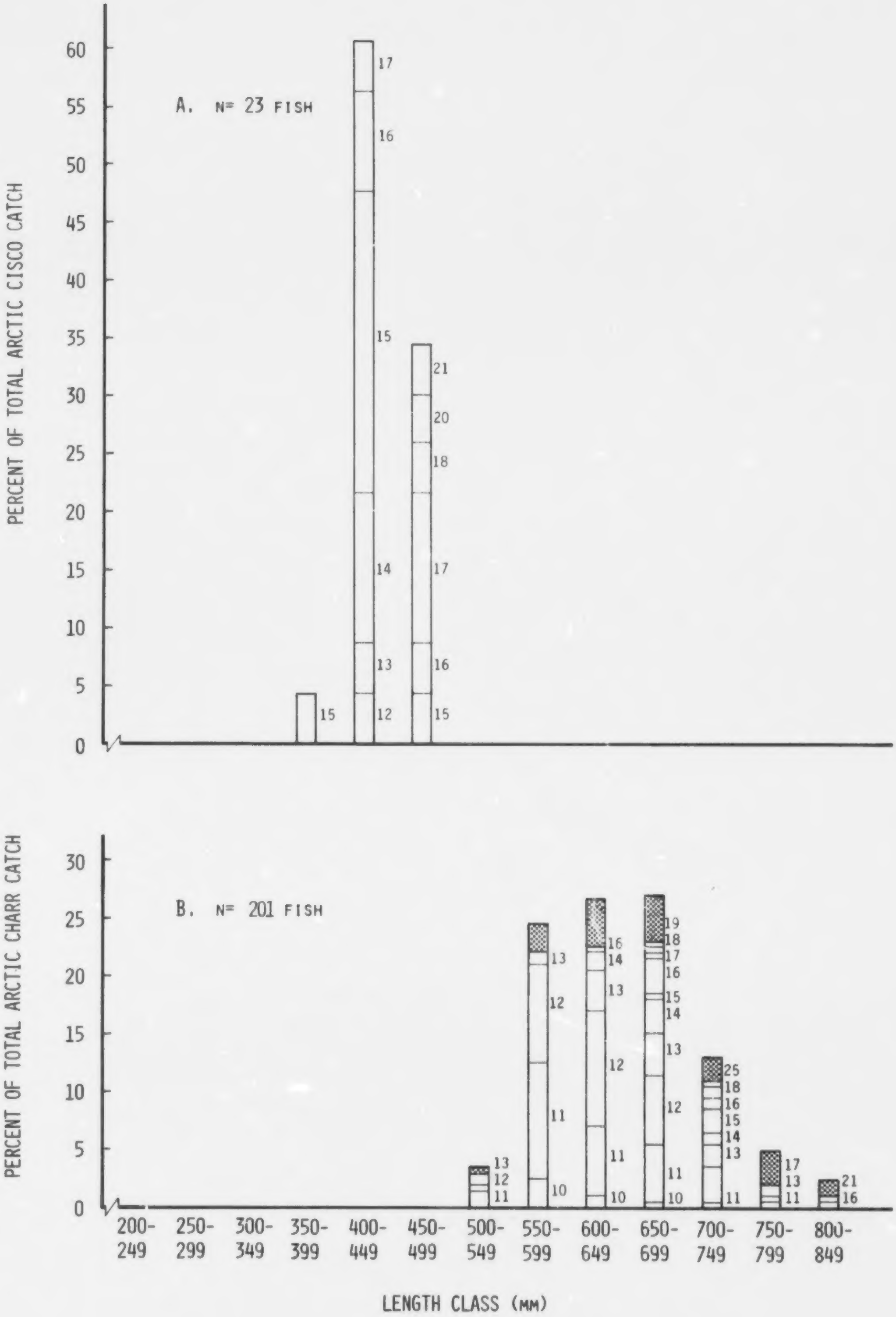

Figure 13. Age-frequency distributions by length class in the catches of a) Arctic cisco and b) Arctic charr from the Hayes River (66°09'N, 95°04'W), N.W.T. Stippling indicates fish whose ages were not determined.

Eubothrium salvelini 5%, *Cystidicola farionis* 3.5%, *Philonema agubernaculum* 2%, and *Thynnascaris adunca* 1.5%. Only *Bothrimonus sturionis*, a parasite contracted by eating marine amphipods (Sandeman and Burt 1972), was present in large numbers. The presence of this parasite, coupled with the relatively low levels of *Diphyllobothrium* sp. cysts, and high bone strontium levels (mean = 1 536 $\mu gSr \cdot g^{-1}$ of bone tissue, std. dev. = 259 $\mu g \cdot g^{-1}$) may make useful biological tags for identifying individual searun charr in mixed populations (Behrens Yamada *et al.* 1979; Moreau and Barbeau 1979; Gaboury 1980; Dick and Belosevic 1981; Stewart and Bernier 1982; Kristofferson pers. comm.).

Lake trout caught in lakes on the Wager Plateau (sites 4-6, 8, and 9) were generally smaller than those in the Hayes River (site 7) and Brown Lake (site 3) which had access to the sea (Tables 14 and 19). Trout were slower growing, lived longer, and generally attained a larger maximum size than charr at the same locations (Figures 13B and 14B). They were also caught in greater numbers except in the Hayes, where there was an influx of anadromous charr. The trout matured about age 12 to 16 years, at fork lengths greater than 310 mm, and lived over 50 years (Table 15). Only 36% of the mature trout were entering spawning condition in late August and early September, so it appears that individual fish do not spawn annually. They begin spawning in early September and probably continue into October.

Chironomids and other fish formed the bulk of the trout stomach contents in late August (Table 20). Tipulids and other dipterans, hymenopterans, algae balls *(Nostoc* sp.*)*, plecopterans, ephemeropterans, and hydracarina were also eaten in the freshwater lake (Appendix IV). Polar cod and marine isopods *(Mesidotea* sp.*)*, either estuarine or marine, were the only foods found in trout from the Hayes River.

Prevalence of metazoan parasite infections in trout was high (Tables 19 and 21). Eighty-one percent of the trout were parasitized by *Diphyllobothrium* sp. *(D. dendriticum* or *D. ditremum)* and 70% by the cestodes *Eubothrium salvelini* and/or *Proteocephalus* sp. The levels of infection were low, with only 2 fish parasitized by more than 50 parasites of a given species. Trout in the Hayes River were also hosts to *Salmincola edwardsii* which infected 33% of the fish, *Echinorhynchus* sp. 21%, *Bothrimonus sturionis* 15%, *Cystidicola cristivomeri* 15%, and *Philonema agubernaculum* 3%. This is the first report of *B. sturionis*, a marine parasite, infecting trout and it indicates that the trout were feeding in a marine or estuarine environment. The presence of *C. cristivomeri* and *Echinorhynchus* sp. indicates that trout in the Hayes River were eating *Mysis relicta* (Smith and Lankester 1979, Prychitko and Nero 1983). It is curious that trout in Brown Lake were not infected by *C. cristivomeri*, *Philonema agubernaculum*, or *Salmincola edwardsii* which normally will infect trout and were found only in a single charr caught in the lake.

Lake whitefish in the Hayes River grew to a large size, 642 mm and 5 060 g, and reached the age of 28 years (Tables 14 and 19). They were all mature and in excellent condition, fat and firm in body. The modal

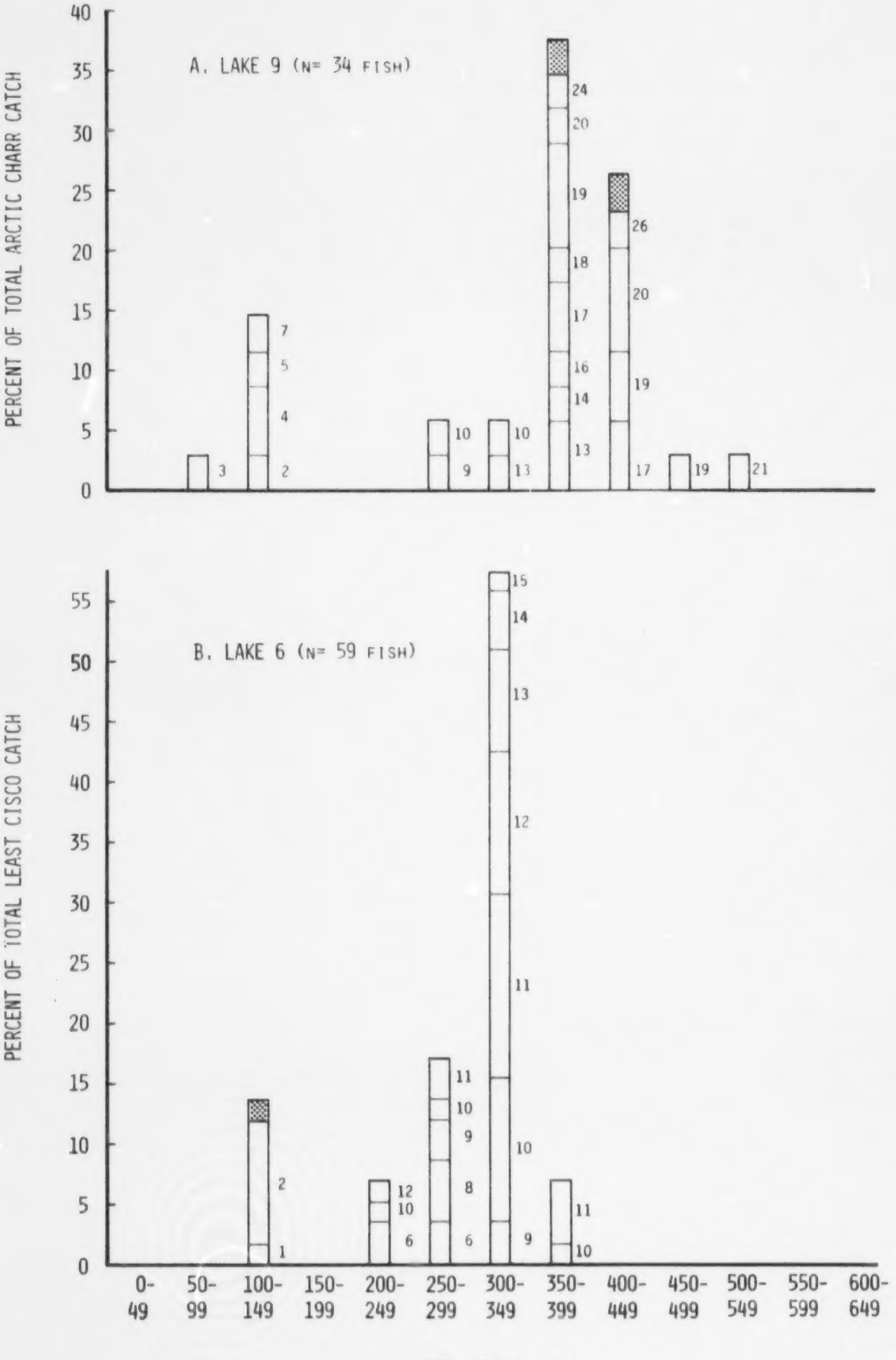

Figure 14. Age-frequency distributions by length class in the catches of a) lake whitefish and b) lake trout from the Hayes River (66°09'N, 95°04'W), N.W.T. Stippling indicates fish whose ages were not determined.

length class in the catch was 450 to 499 mm and contained fish ranging from 15 to 22 years of age (Figure 14A). They were mature by age 12 to 13 years and at lengths over 375 mm (Table 15). Individual fish do not appear to spawn annually since only 22% of the mature fish were entering spawning condition in early September. Spawning probably begins in October.

Only one lake whitefish had fed recently, its stomach contained a marine isopod, *Mesidotea* sp. (Table 20). Amphipods and copepods form a portion of the fishes diet as indicated by the presence, in the fish, of parasites which they vector. Metazoan parasites infected 75% of the fish examined (Tables 19 and 21). *Bothrimonus sturionis* infected 27% of the fish, cestodes 17%, *Salmincola extumescens* 15%, *Cystidicola farionis* 3%, *Echinorhynchus* sp. 3%, *Coregonicola orientalis* 2%, and *Diphyllobothrium* sp. 2%. None of the parasites were numerous and all of the *Diphyllobothrium* sp. cysts in the fish which hosted that parasite, were calcified and unviable.

Anadromous (searun) Arctic cisco were caught in Shepherd Bay and upstream from the mouth of the Hayes River (Table 19, sites 7 and 11). They grew larger (498 mm) and lived longer (21 years) than fish from most other populations in the Canadian Arctic (Bond 1982; Peet pers. comm.) except those in the nearby Back (MacDonald and Stewart 1980) and Murchison rivers (Lawrence unpubl. data). All of the fish were mature and in excellent condition (Tables 14 and 15). There was a wide range of ages within each length class in the population and the youngest and smallest fish were 12 years old and 370 mm long respectively (Figure 13A). The presence of ripe individuals in early September indicated that spawning would begin in mid to late September and probably continue into October.

None of the Arctic cisco had food in their stomachs when they were caught and metazoan parasites infected 71% of the fish examined (Tables 19 and 21). *Diphyllobothrium dendriticum* and/or *D. ditremum* infected 67% of the fish, *Bothrimonus sturionis* 14%, cestodes 10%, and acanthocephalans 5% of the fish. Levels of parasite infections were low.

Three burbot were caught in the Hayes River, a northeastward extension of some 100 km from their previous known range (Plate 8; MacDonald and Stewart 1980). All were large mature adults (Table 19). They lived longer than burbot in most known populations in Canada, 17 to 25 years (Day pers. comm.). Only one of the fish was entering spawning condition, suggesting that the species does not spawn annually in the area and that it spawns during the winter months. One burbot examined had eaten fish and two of the burbot were parasitized by *Salmincola lotae*, a parasite hitherto reported only in burbot from Russia (Kabata 1969; Margolis and Arthur 1979).

Ninespine stickleback and juvenile least cisco were caught in a small shallow lake on the Victoria Lowlands, near the coast (Table 19, site 10). Such lakes serve as important summer rearing areas for young of all of the fresh water species caught in the area.

Nine species of marine fishes were found along the northeastern Keewatin coast during the survey (Table 19). Capelin *(Mallotus villosus)*, fourline snakeblenny *(Eumesogrammus praecesus)*, and spatulate *(Icelus spatula)*, shorthorn *(Myoxocephalus scorpius)*, ribbed *(Triglops pingelii)*, and Arctic staghorn *(Gymnocanthus tricuspis)* sculpins were caught in Ford Lake, a marine bay connected to Wager Bay by a reversing falls (site 2). The capelin were numerous, uniform in size, and preparing to spawn when they were caught in mid-August. Shorthorn and ribbed sculpin were common but only one fourline snakeblenny and a few spatulate and Arctic staghorn sculpin were caught. Greenland cod and fourhorn sculpin were caught along the coast of Shepherd Bay (site 11). The cod ranged in size from 190 mm to 520 mm and had eaten fourhorn sculpin, isopods, and amphipods (Table 20). They were hosts to three species of metazoan parasites, two of the genus *Echinorhynchus* and an unidentified cestode (Table 21). Fourhorn sculpin were numerous. Polar cod otoliths were found in the stomachs of many of the searun charr and trout caught in the Hayes River (site 7). The cod are a very important food resource for those species during the summer and must be abundant in Chantrey Inlet.

Fourhorn sculpin from Shepherd Bay were generally smaller than shorthorn sculpin from Ford Lake (Table 14). Both species were entering spawning condition in late August and spawning would appear to occur in late September or October (Table 15). In both species, individual fish over 200 mm long were mature. Not all of the mature fish were preparing to spawn, suggesting that individuals do not spawn annually. The fourhorn sculpin fed on isopods, amphipods, and mysids and were free of metazoan parasites (Tables 20 and 21). The shorthorn sculpin fed on gastropods, decapods, amphipods, isopods, mysids, capelin, kelp, and pelecypods (Table 26). They were hosts to two species of marine leeches *(Malmiana brunnea* and *Platybdella olriki)*, marine cestodes, and *Phocanema decipiens* (Table 21). Both the rates and levels of infections were low.

Ribbed sculpin were smaller than either fourhorn or shorthorn sculpin and were also preparing to spawn (Table 19). They had eaten kelp and were parasitized by a marine cestode (Table 20 and 21).

SUMMARY

Samples of water and aquatic and marine biota were collected between 3 August and 10 September, 1982, from southern Victoria Island, King William Island, and the northeastern District of Keewatin. Resource utilization and previous research in the study area are summarized.

River and lake ice in the area begins breaking up in June but some large lakes still have ice in August. Freeze-up begins in late August or early September, but is not complete in some areas until October. Stream runoffs are generally highest during breakup, but high late-summer runoffs are common in the Hayes and Murchison rivers where orographic precipitation can cause extreme fluctuations in stream discharges. Queen Maud and Coronation gulfs, Rasmussen Basin, and Chantrey Inlet were all nearly ice-free in August. Channels to the north were choked with new and/or multi-year sea ice.

Lakes with basins of igneous rock were ultraoligotrophic, cold monomictic, and had acidic pH's. They had low ionic concentrations with conductivities less than 60 μS·cm^{-1}. Inland lakes with basins of sedimentary rock were oligotrophic, cold monomictic, and had basic pH's. They were ion poor, with conductivities ranging from 80 to 230 μS·cm^{-1}. Calcium and magnesium were the major ions contributing to conductivities and chloride concentrations were variable. Low-lying coastal lakes were cold monomictic, had basic pH's, and were probably oligotrophic. The conductivities were higher, 210 to 470 μS·cm^{-1}, mainly due to higher chloride and sodium ion concentrations. Total dissolved nitrogen and phosphorous concentrations increased from the plateau lakes to the coastal lakes, as did the amount of shoreline vegetation. Phosphorous was the limiting nutrient except in a single shallow coastal lake where the N/P ratio was 3.2 and chlorophyll A concentrations were much higher. Nutrient concentrations were greatest in lakes where unconsolidated shoreline soils were eroding into the water.

Twenty-six species or forms of crustacean zooplankters were found during the survey, 20 on Victoria Island, 8 on King William Island and 11 in the northeastern District of Keewatin. Four species, *Cyclops scutifer*, *Eurytemora canadensis*, *Bosmina longirostris*, and *Chydorus sphaericus* were common to all three areas. The abundance and diversity of species was greater on Victoria Island than in most other areas of the Canadian Arctic Archipelago and increased across the island from the northeast to the southwest. Diaptomid species were notably absent from samples taken on King William Island.

There are Arctic charr, lake trout, least and Arctic cisco, and ninespine stickleback on both Victoria and King William islands and in the northeastern District of Keewatin; lake whitefish on Victoria Island and in the northeastern Keewatin; lake cisco, round whitefish, and burbot in the northeastern Keewatin; and fourhorn sculpin in fresh water on Victoria Island. Charr, trout, and probably stickleback occur throughout the study area in lakes that do not winterkill. The other species are near the northern limits of their ranges and occur in drainages where there are deep lakes and navigable rivers.

Individual fish of these species have variable growth rates, spawn in the fall, but do not appear to spawn annually. In large rivers and coastal lakes there is often an anadromous (searun) component to the population. These anadromous fish generally grow larger, faster, and are in better condition. They are opportunistic and omnivorous feeders and host a variety of metazoan parasites. Their parasite faunas and the rates and levels of parasitism generally depend on their diet and the presence of intermediate host species.

Fourhorn sculpin, fish doctor, and three species of cod were identified from northern marine waters in the study area and capelin, fourlined snakeblenny, and five species of sculpin were caught in Ford Lake, a marine extension of Wager Bay. Large Greenland cod were preying on fourhorn sculpin and cod were an important food for anadromous charr and trout. Further research is needed to elucidate the distributions and life histories of marine fishes in Arctic Canada.

Domestic and commercial fishing are mainstays of the area's economy. Anadromous Arctic charr is the main species sought after and the largest commercial charr fishery in the Northwest Territories is located at Cambridge Bay. There is increasing interest in commercial fishing elsewhere in the area.

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Water chemistry analyses were performed by Mike Stainton and personnel of the Freshwater Institute's Analytical Group; Dr. and Mrs. Kaz Patalas identified the zooplankton; members of the Freshwater Institute, University of Manitoba, National Museum of Natural Sciences, and Biosystematic Research Institute confirmed identification of invertebrate samples; Dr. Don McAllister confirmed the marine fish identifications and kindly supplied us with pre-publication copies of several manuscripts; and Chris Day, Gary Carder, and Dr. Ken Mills corroborated our fish age determinations. Allan Kristofferson, Roger Peet, and Gerald Yaremchuk gave us free access to their unpublished commercial fishing data; Dr. Ed Crossman gave us access to the Royal Ontario Museum's fish collection; and Colin Dickie, Billy Lyall, Elijah Hiqiniq, Peter Ikkuisliuq, Alex Ruben, Elijah and Nelson Takkiruq, Matthew Tiriganeak, and Jacob Ekinilik helped us in the field. Their participation has greatly strengthened the project and we thank them.

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APPENDIX I. MARINE FISH SPECIES DISTRIBUTIONS

MARINE FISH SPECIES DISTRIBUTIONS

Research on marine fishes in the Canadian Arctic has been limited by expense and logistical difficulty to comparatively shallow, short-term test fisheries. Consequently, distributional information on marine fishes in the survey area is incomplete and life history information is lacking, particularly for deep water species.

Table 16 lists marine fish species that have been collected in the survey area, together with approximate catch locations (Fig. 15). The table references specimens collected during this survey, published collection records, personal communications from fisheries biologists, and Royal Ontario Museum (R.O.M.) collections. Personal communications from Dr. D. E. McAllister, curator of fishes at the N.M.N.S., denote specimens housed in the museum's collection. Dr. McAllister kindly supplied the authors with prepublication copies of maps which detail distributions of marine fish species in the Canadian Arctic and are based on the N.M.N.S. collection. These maps will be published in a book entitled Marine Fishes of Arctic Canada, which Drs. McAllister and J. G. Hunter are preparing (Hunter *et al.* 1983). References currently available on marine fishes in the Canadian Arctic and on Arctic cod have been compiled in bibliographies by Robinson and McAllister (1981) and Dewar *et al.* (1983).

Complete life history studies have not been conducted for marine fishes in the Canadian Arctic. Even the biology of Arctic cod, a vitally important food for anadromous fishes, seabirds and marine mammals, is not understood (Bain and Sekerak 1978; Davis *et al.* 1980; Bradstreet 1980; 1982; Bradstreet and Cross 1982; Craig *et al.* 1982; Finley and Gibb 1982; Bradstreet pers. comm.). While we know the cod's importance in the food chain, as a consumer of invertebrates and sculpins and as food for the top level carnivores, information on the species abundance, movements, spawning habits, and general biology is lacking. Clearly, further research is needed to elucidate the distributions and life histories of marine fishes in Arctic Canada.

Table 16. Distribution records of fish species caught in marine waters of the 1982 study area.

Species Name		
Scientific	Common	Catch Location (Fig. 15) and Reference
F. Clupeidae		
Clupea harengus pallasi Valenciennes, 1847	Pacific herring	6, 8, 10 (McAllister pers. comm.)*; 8 (Richardson 1823); 8 (ROM)**.
F. Salmonidae		
Coregonus autumnalis (Pallas, 1776)	Arctic cisco	19, 21 (this study); 4, 6, 8, 10, 13, 20 (McAllister pers. comm.); 4 (Sutherland and Gohlke 1978); 3 (Walters 1953a); 3, 8 (Walters 1955); 2 (Williams *et al.* 1981).
Coregonus clupeaformis (Mitchill, 1818)	Lake whitefish	19 (this study); 5, 8 (Richardson 1823); 25 (Stephansson and Kostiuk 1975); 5,8 (Walters 1953a, 1955)
Coregonus nasus (Pallas, 1776)	broad whitefish	4, 6 (Sutherland and Gohlke 1978); 5 (Walters 1953a; ROM); 8 (Walters 1955; ROM).
Coregonus sardinella Valenciennes, 1848	least cisco	11 (this study); 4, 10, 13, 15 (McAllister pers. comm.).
Prosopium cylindraceum (Pallas, 1784)	round whitefish	7 (ROM); 7 (Stewart and MacDonald 1978); 4 (Sutherland and Gohlke 1978).
Salvelinus alpinus (Linnaeus, 1758)	Arctic charr	Present throughout coastal marine waters of study area between June and September. See text for further information.
Salvelinus namaycush (Walbaum, 1792)	lake trout	19, 21 (this study); 25 (Stephansson and Kostiuk 1975); 7(Stewart and MacDonald 1978); 9 (Sutherland and Gohlke 1978); 8 (Walters 1953a); 7 (ROM); 2 (Williams *et al.* 1981).
Thymallus arcticus (Pallas, 1776)	Arctic grayling	19 (Orr pers. comm.); 4 (ROM); 4, 9 (Sutherland and Gohlke 1978).
F. Osmeridae		
Mallotus villosus (Muller, 1776)	capelin	27 (this study); 4 (Ellis 1962); 4, 7, 19, 20 (McAllister 1963); 8 (Richardson 1823); 4, 8 (Walters 1955).
Osmerus mordax (Mitchill, 1814)	rainbow smelt	8 (McAllister 1963); 4, 8 (McAllister pers. comm.).
F. Catostomidae		
Catostomus catostomus (Forster, 1773)	longnose sucker	4 (ROM; Sutherland and Gohlke 1978).
F. Gadidae		
Arctogadus borisovi Drjagin, 1932	toothed cod	13 (Boulva 1972); 16 (MacDonald and Stewart 1980); 5, 12, 13 (McAllister pers. comm.); 5, 13, 23 (Nielsen and Jensen 1967).
Arctogadus glacialis (Peters, 1874)	polar cod	19 (this study)[1] 13 (Boulva 1972); 5, 6, 9, 12, 13 (McAllister pers. comm.); 5 (Nielsen and Jensen 1967).
Boreogadus saida (Lepechin, 1774)	Arctic cod	3, 5-9, 12, 13, 23, 25, 26 (McAllister pers. comm.); 20 (Pfaff 1937); 24 (Ross 1835); 3, 5 (Walters 1953a).
Eleginus gracilis (Tilesius, 1810)	saffron cod	4 (Ellis 1962); 16 (MacDonald and Stewart 1980); 4, 6-10, 12, 13 (McAllister pers. comm.); 20 (Pfaff 1937); 8 (Walters 1953a; ROM); 4, 8 (Walters 1955).
Gadus ogac Richardson, 1836	Greenland cod	21 (this study); 13 (Boulva 1972); 4, 13, 23 (Ellis 1962); 4, 6-10, 12, 13, 20, 23 (McAllister pers. comm.); 20 (Pfaff 1937); 23 (Ross 1835); 7, 9 (Walters 1953a; ROM).
Lota lota (Linnaeus, 1758)	burbot	19 (this study); 4 (Ellis 1962); 4 (McAllister pers. comm.); 4 (Simpson 1843, in Preble 1908).
F. Zoarcidae		
Gymnelis hemifasciatus Andriashev, 1937	bigeye unernak	13 (McAllister pers. comm.).
Gymnelis retrodorsalis Le Danois, 1913	aurora unernak	9, 13 (McAllister pers. comm.); 13 (McAllister *et al.* 1981).
Gymnelis viridis (Fabricius, 1780)	fish doctor	13 (this study); 9, 12, 13, 18, 23 (McAllister pers. comm.); 7 (Walters 1953a).
Lycodes jugoricus Knipowitch, 1906	shulupaoluk	13, 23 (McAllister pers. comm.).
Lycodes mucosus Richardson, 1855	saddled eelpout	9, 11, 13 (McAllister pers. comm.); 5 (Walters 1953a).
Lycodes pallidus Collett, 1878	pale eelpout	6, 8, 9, 12, 13 (McAllister pers. comm).
Lycodes polaris (Sabine, 1824)	polar eelpout	9, 12, 13 (McAllister pers. comm.).
Lycodes reticulatus Reinhardt, 1835	Arctic eelpout	13 (McAllister pers. comm.).
Lycodes rossi Malingren, 1864	threespot eelpout	4, 9, 12, 13 (McAllister pers. comm.); 4, 9, 13 (McAllister *et al.* 1981).
F. Anarhichadidae		
Anarhichas orientalis Pallas, 1814	Bering wolffish	8 (Legendre *et al.* 1975); 6, 8, 9 (McAllister pers. comm.).
F. Stichaeidae		
Eumesogrammus praecisus (Krøyer 1837)	fourline snakeblenny	27 (this study); 9, 13 (McAllister pers. comm.).
Stichaeus punctatus (Fabricius, 1780)	Arctic shanny	10 (McAllister pers. comm.).
F. Lumpenidae		
Anisarchus medius (Reinhardt, 1838)	stout eelblenny	9, 13 (McAllister pers. comm.).
Leptoclinus maculatus (Fries, 1837)	daubed shanny	12, 13 (McAllister pers. comm).
Lumpenus fabricii (Valenciennes, 1836)	slender eelblenny	6, 9, 11, 13 (McAllister pers. comm).

Table 16. Cont'd

Species Name		Catch Location (Fig. 15) and Reference
Scientific	Common	
F. Pholididae		
Pholis fasciata (Bloch and Schneider, 1801)	banded gunnel	4, 9 (McAllister pers. comm.).
F. Ammodytidae		1 (McAllister pers. comm.).
Ammodytes dubius Reinhardt, 1837	northern sandlance	13 (McAllister pers. comm); 9 (Pfaff 1937).
Ammodytes hexapterus Pallas, 1814	stout sandlance	13 (McAllister pers. comm.); 3 (Walters 1955).
F. Cottidae		1 (McAllister pers. comm.).
Artediellus scaber Knipowitsch, 1907	rough hookear	9, 13 (McAllister pers. comm.).
Artediellus uncinatus (Reinhardt, 1835)	Arctic hookear sculpin	3 (Walters 1953a; ROM).
Gymnocanthus tricuspis (Reinhardt, 1832)	Arctic staghorn sculpin	27 (this study); 3, 6, 9, 11-13, 22 (McAllister pers. comm.); 3 (Walters 1953a).
Icelus bicornis (Reinhardt, 1841)	twohorn sculpin	8, 9, 12, 13, 24, 26 (McAllister pers. comm.); 3 (Walters 1953a, b; ROM).
Icelus spatula Gilbert and Burke, 1912	spatulute sculpin	27 (this study); 8-13 (McAllister pers. comm.); 3 (Walters 1953b).
Myoxocephalus quadricornis (Linnaeus, 1758)	fourhorn sculpin	13, 21, 27 (this study); 5 (Anderson 1913); 13 (Cowan 1972); 4, 13 (Ellis 1962); 16, 19 (MacDonald and Stewart 1980); 3-10, 12-14, 16, 20, 24, 25, 26, (McAllister 1959, pers. comm); 20 (McAllister and Aniskowicz 1976); 25 (Peet pers. comm.); 20 (Pfaff 1937); 7 (ROM); 24 (Ross 1835); 7, 8 (Stewart and MacDonald 1978); 4, 9 (Sutherland and Gohlke 1978); 3 (Walters 1953a); 3, 9 (Walters 1955; ROM); 2 (Williams *et al.* 1981); see also (Richardson 1823).
Myoxocephalus scorpioides (Fabricius, 1780)	Arctic sculpin	3, 12, 13, 26 (McAllister pers. comm.); 3(Walters 1953a; ROM).
Myoxocephalus scorpius (Linnaeus, 1758)	shorthorn sculpin	27 (this study); 13 (Ellis 1962); 3, 6, 10-13, 20, 26 (McAllister pers. comm.); 17 (ROM); 3, 7 (Walters 1953a; ROM).
Triglops nybelini Jensen, 1944	bigeye sculpin	9, 13 (McAllister pers. comm.).
Triglops pingelii Reinhardt, 1831	ribbed sculpin	27 (this study); 3, 9, 12, 13, 26 (McAllister pers. comm.); 3 (Walters 1953a; ROM).
F. Agonidae		
Aspidophoroides olriki Lütken, 1876	Arctic alligatorfish	6-9, 12, 13 (McAllister pers. comm).
Leptagonus decagonus (Bloch and Schneider, 1801)	Atlantic poacher	8, 9, 12, 13 (McAllister pers. comm.).
F. Cyclopteridae		
Careproctus sp.		9 (McAllister pers. comm.).
Eumicrotremus derjugini Popov, 1926	leatherfin lumpsucker	13 (McAllister pers. comm.).
Eumicrotremus spinosus (Fabricius in Müller, 1776)	Atlantic spiny lumpsucker	1, 12, 13, 24, 26 (McAllister pers. comm).
F. Liparididae		
Liparis fabricii Krøyer, 1847	gelatinous snailfish	10, 13 (Able and McAllister 1980); 9, 12, 13 (McAllister pers. comm.); 24 (Ross 1835).
Liparis gibbus Bean, 1881	dusky snailfish	9, 24 (Able and McAllister 1980); 9, 24 (McAllister pers. comm.); 24 (Ross 1835).
Liparis tunicatus Reinhardt 1837	Greenland seasnail	13, 26 (Able and McAllister 1980); 3, 13, 26 (McAllister pers. comm).
F. Gasterosteidae		
Pungitius pungitius (Linnaeus, 1758)	ninespine stickleback	4, 5 (Sutherland and Gohlke 1978).
F. Pleuronectidae		
Hippoglossoides robustus Gill and Townsend, 1897	Bering flounder	9 (McAllister pers. comm.).
Limanda proboscidea Gilbert, 1895	longhead dab	9 (McAllister pers. comm.).
Liopsetta glacialis (Pallas, 1776)	Arctic flounder	4, 8 (Ellis 1962); 16 (MacDonald and Stewart 1980); 4, 8, 10, 13 (McAllister pers. comm.); 8 (Richardson 1823, 1854); 4, 9 (Sutherland and Gohlke 1978); 8 (Walters 1955).
Platichthys stellatus (Pallas, 1814)	starry flounder	4 (Ellis 1962); 4, 5, 8-10 (McAllister pers. comm.); 9 (Stewart[2] unpubl. data); 4, 5, 8 (Sutherland and Gohlke 1978); 5 (Walters 1953a); 4, 5, 8 (Walters 1955); see also (Richardson 1823).

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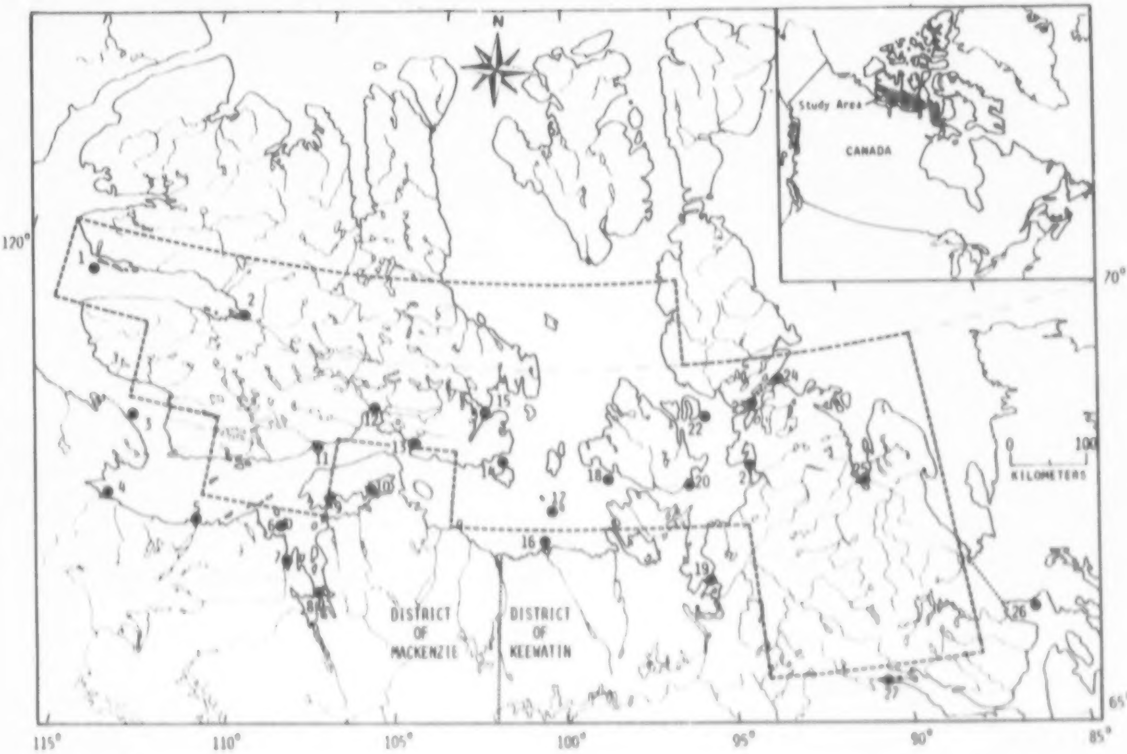
* See explanation in text.

** ROM denotes specimens housed in the Royal Ontario Museum. Following a citation, it denotes that the specimens referred to are preserved in the ROM collection.

[1] identified from otoliths.

[2] photograph.


N
Study Area
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120°
70°
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115°
110°
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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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27

Figure 15. Locations where marine fish species have been caught, either in or near the 1982 study area which is denoted by a dotted line.

APPENDIX II. FRESHWATER FISH SPECIES DISTRIBUTIONS

FRESHWATER FISH SPECIES DISTRIBUTION

This appendix illustrates catch records of each freshwater fish species that has been collected in the study area or from nearby drainages. Within these drainages, the distributions are exhaustive, elsewhere they include only the catches of previous Northern Land Use Information Series (NLUIS) surveys. For a catch report to be included on the distribution maps, the species identification must have been verified by several researchers, preferably supported by preserved specimens, or, as in the case of an adult male Arctic grayling reported from Chantrey Inlet (Orr pers. comm.), it must be unmistakable. Reports of domestic fishermen have not been included here because of the possibility of misinterpretation. These reports are generally very reliable and reading the domestic fishing descriptions in text will help to fill in gaps in the Arctic charr and lake trout distributions.

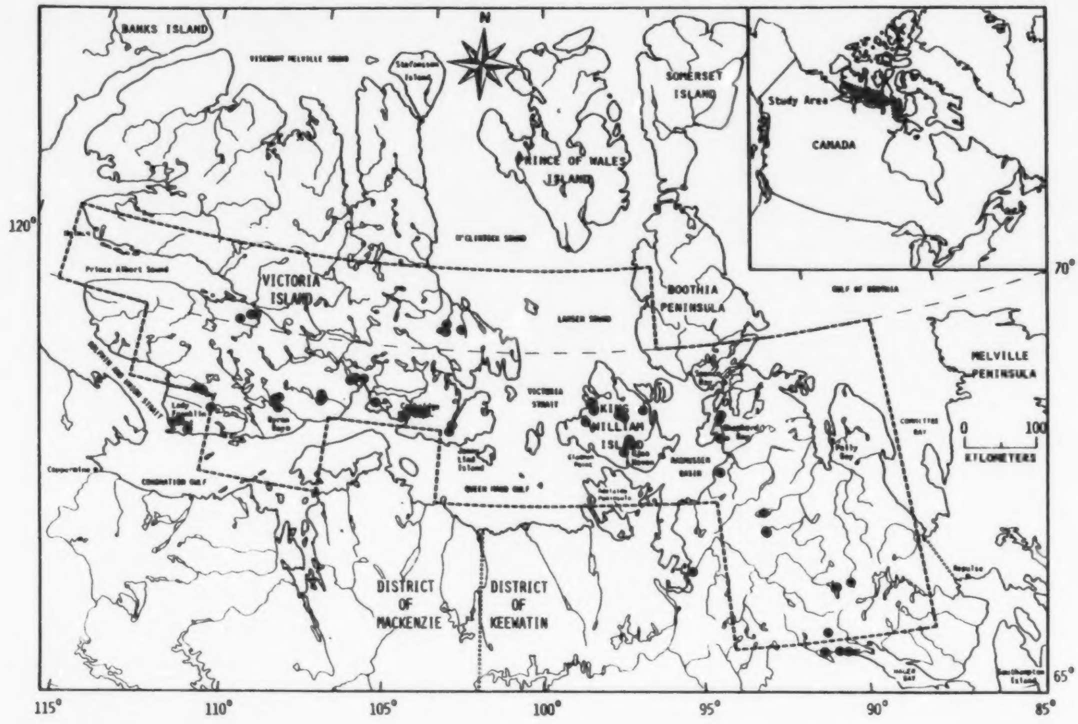
Sites sampled during the present survey are shown in Fig. 16. On each species distribution map, the study area is enclosed by a dashed line and species catch locations are marked by either a solid circle (●), an open circle (○), or an open square (□). Solid circles denote specimens collected during the 1982 NLUIS aquatic resource survey, open circles denote specimens collected during previous NLUIS surveys, and open squares denote specimens collected by other researchers. Representative specimens from the area are preserved in the National Museum of Natural Sciences collection in Ottawa.

Previous NLUIS surveys have sampled drainages on Banks Island and along the District of Mackenzie coast (Sutherland and Gohlke 1978), further inland in the District of Mackenzie (Stewart and MacDonald 1978), along the Keewatin coast (MacDonald and Stewart 1980), on Somerset Island (Stewart and MacDonald 1981), and on northern Victoria and Prince of Wales islands (Stewart and Bernier 1982).

Other researchers who have sampled on Victoria Island include Walters (1953a), who reported fish on Wollaston Peninsula; Johnson (1962, 1964, 1973, 1976, 1980, 1981, 1983, pers. comm.), who sampled lakes near Cambridge Bay and further inland to the north and east; Hunter (1970), who sampled Keyhole Lake west of Cambridge Bay; Carder (1981, pers. comm.), Dahlke (pers. comm.), Gyselman (1982), Kristofferson and Carder (1980), and McGowan (pers. comm.), who sampled anadromous (searun) Arctic charr populations along the southern coast and adjacent mainland; Williams *et al.* (1981), who sampled lakes and rivers down the west side of the island; Lee *et al.* (1980), who reported several new catch records scattered throughout the island; and McAllister (pers. comm.), who reported the occurrence of several species in the Kuujjua River and confirmed many of the species reports throughout the study area, based on specimens in the N.M.N.S. collection. Johnson's works are also the basis for species reports from Kent Peninsula.

Pfaff (1937) reported that the 5th Thule Expedition caught cisco, lake trout, and ninespine stickleback on King William Island, but only Lee *et al.* (1980) have shown catch locations for fish cuaght on the island. Boothia Peninsula and the northeastern District of Keewatin have been sampled by Sekerak and Graves (1975), who surveyed Boothia Peninsula; Hatfield *et al.* (1977, 1978), who sampled drainages from the Hayes River north to Lord Lindsay Lake; Lawrence *et al.* (1977) and Lawrence and Davies (1978), who sampled Amitouryuak Lake and lakes on the Lord Lindsay and Murchison river systems; and Kristofferson *et al.* (1981), Orr (pers. comm.), Peet (pers. comm.), and Stefasson and Kostiuk (1975), who sampled coastal river systems entering Pelly and Committee bays, Sherman and Rasmussen basins, and Chantrey Inlet.

Detailed descriptions of catch records within the study area are presented in the sections on previous research, in text.


BANKS ISLAND
VISCOUNT MELVILLE SOUND
Stefansson Island
N
SOMERSET ISLAND
Study Area
CANADA
PRINCE OF WALES ISLAND
M'CLINTOCK SOUND
Prince Albert Sound
VICTORIA ISLAND
BOOTHIA PENINSULA
GULF OF BOOTHIA
LARSEN SOUND
MELVILLE PENINSULA
DOLPHIN AND UNION STRAIT
Lady Franklin
Byron Bay
VICTORIA STRAIT
KING WILLIAM ISLAND
COMMITTEE BAY
0
100
KILOMETERS
Jenny Lind Island
Gjoa Haven
RASMUSSEN BASIN
Pelly Bay
Coppermine
CORONATION GULF
QUEEN MAUD GULF
Adelaide Peninsula
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
Repulse
WAGER BAY
Southampton Island
120°
70°
65°
115°
110°
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95°
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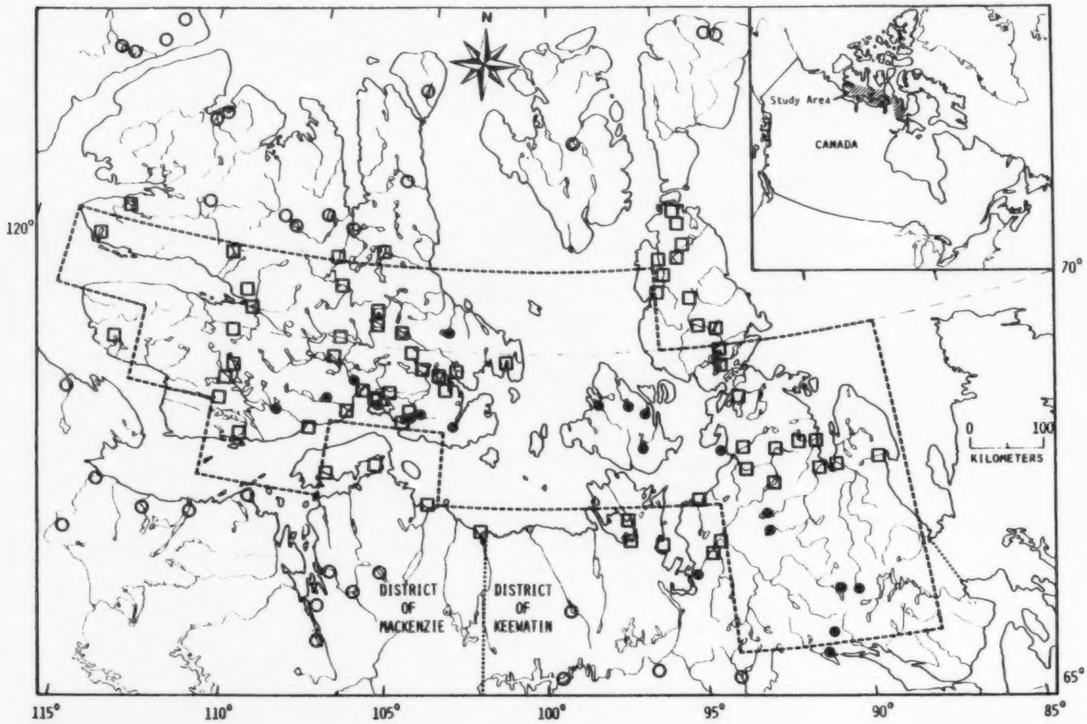
Figure 16. Sites fished during the 1982 NLUIS aquatic resource survey.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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105°
100°
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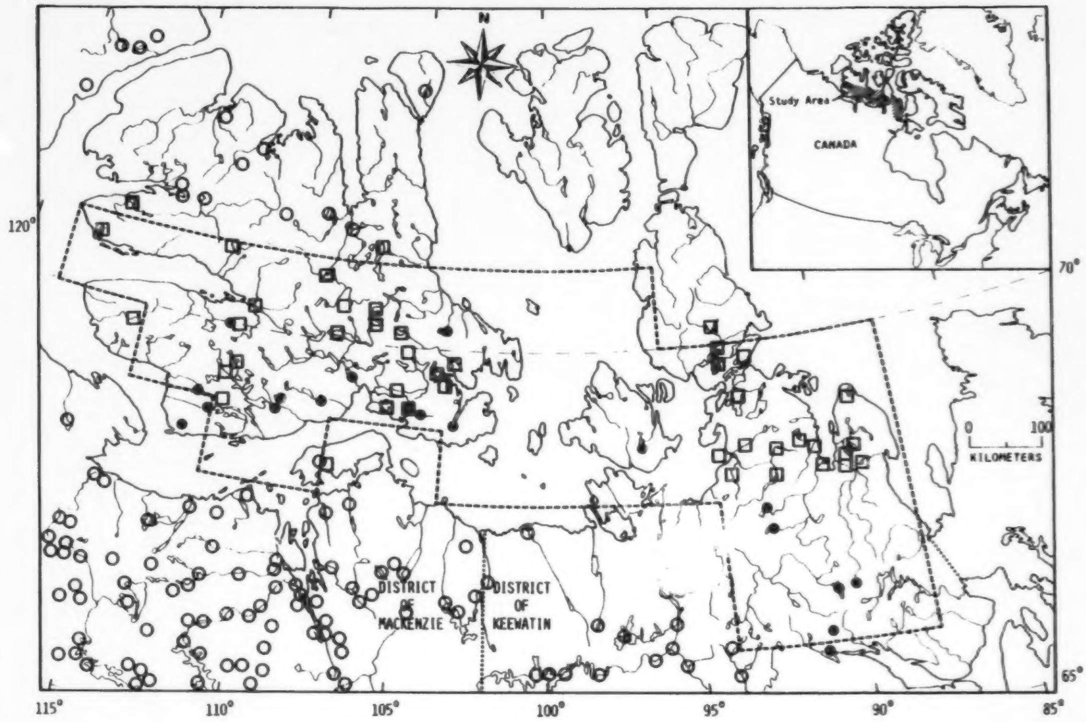
85°

Figure 17. Distribution of Arctic charr *Salvelinus alpinus*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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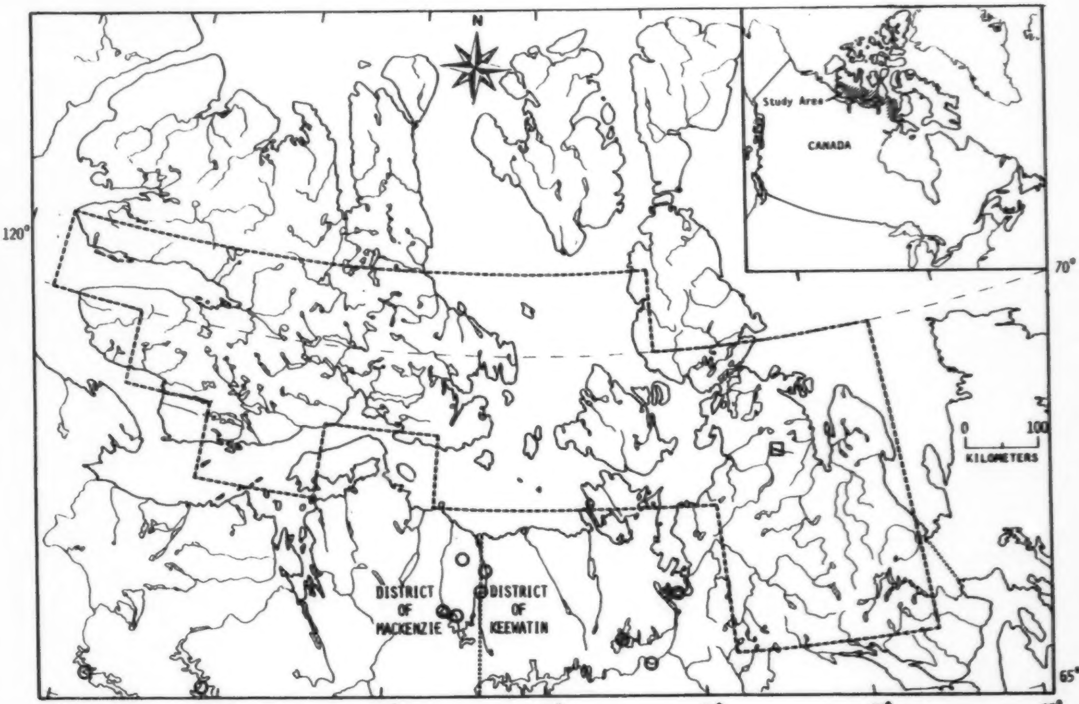
Figure 18. Distribution of lake trout *Salvelinus namaycush*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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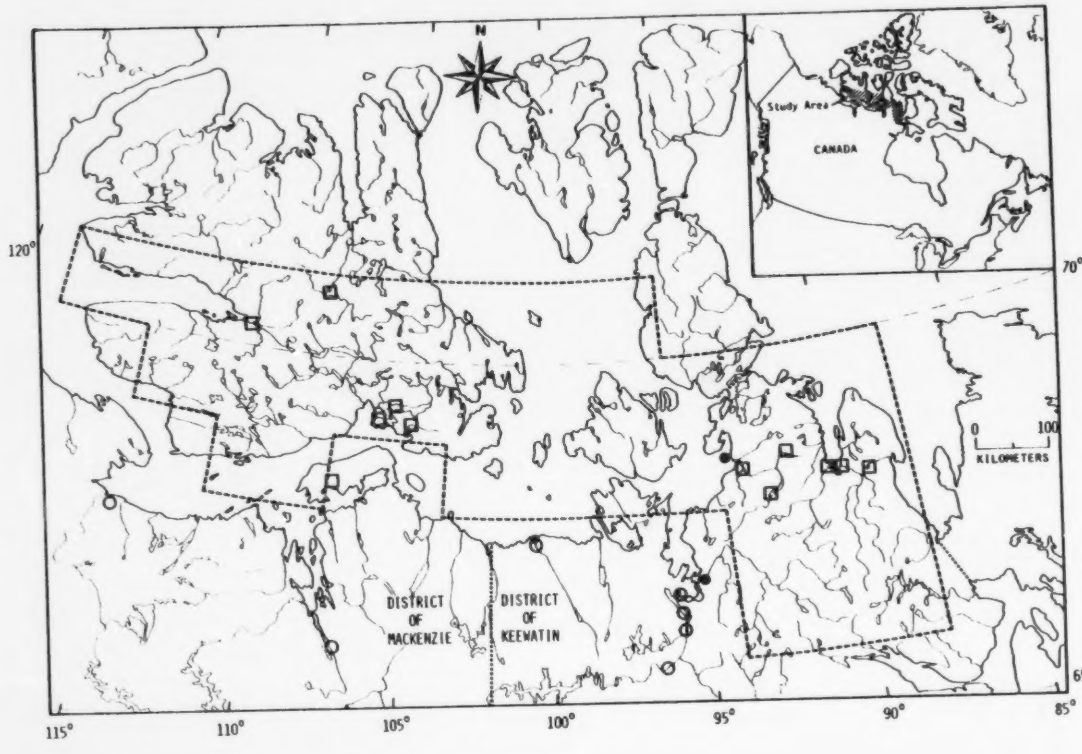
Figure 19. Distribution of lake cisco *Coregonus artedii*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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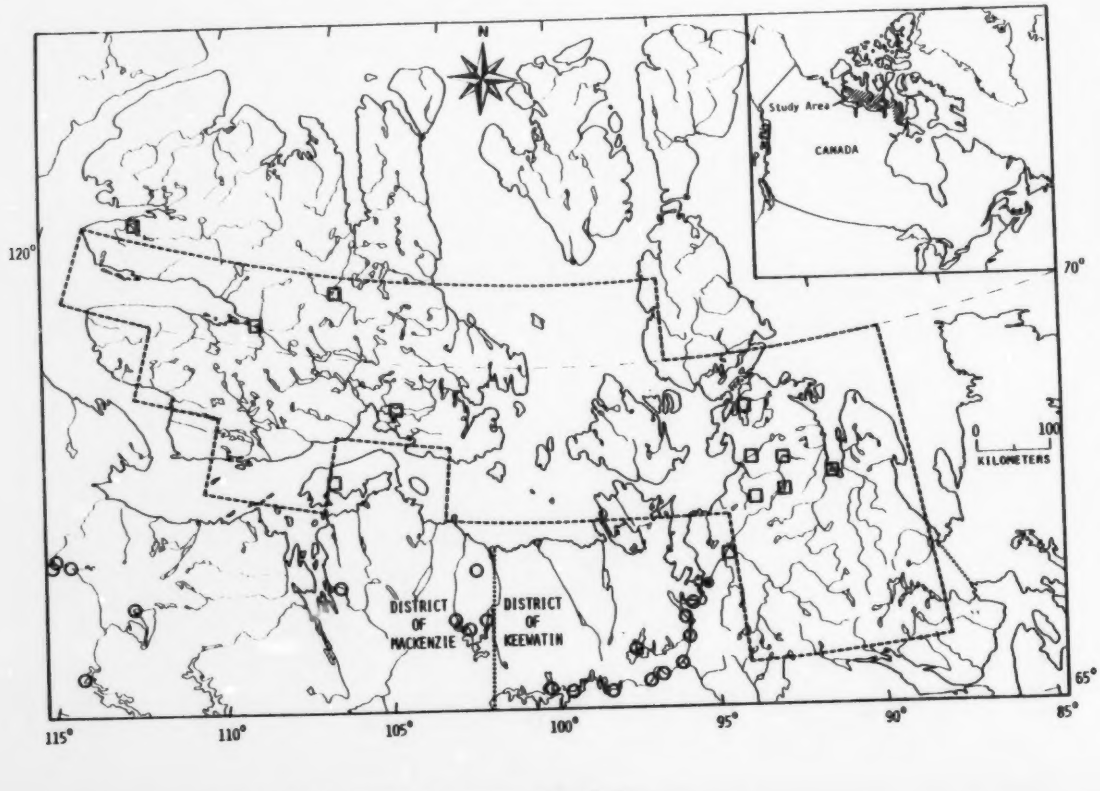
Figure 20. Distribution of Arctic cisco *Coregonus autumnalis*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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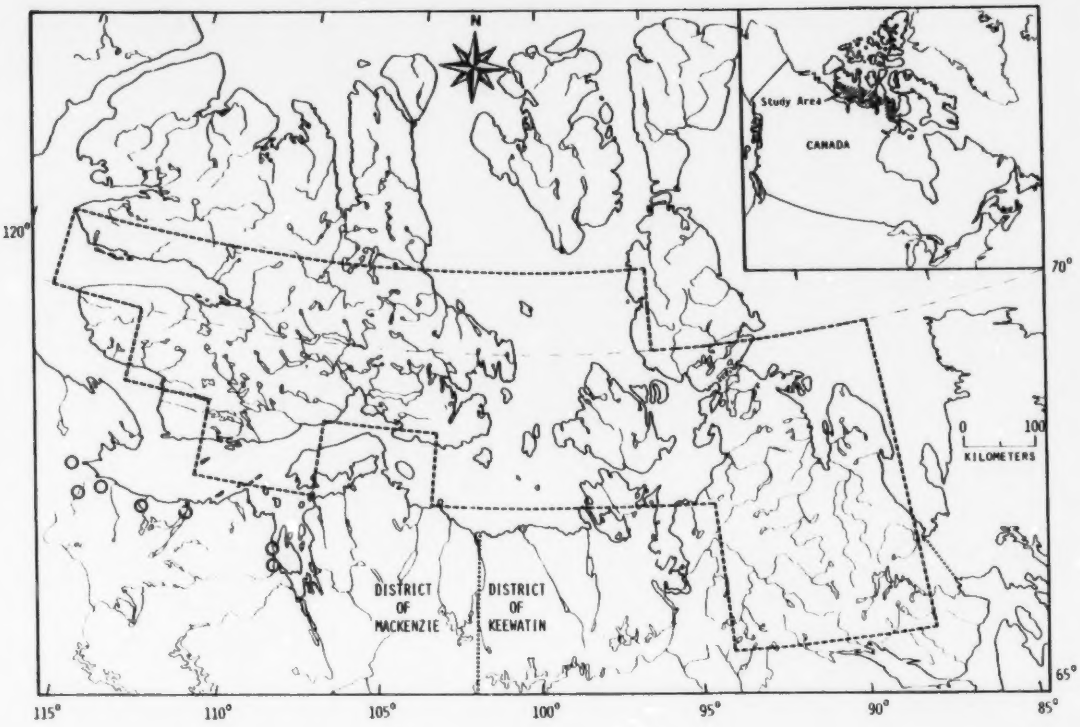
Figure 21. Distribution of lake whitefish *Coregonus clupeaformis*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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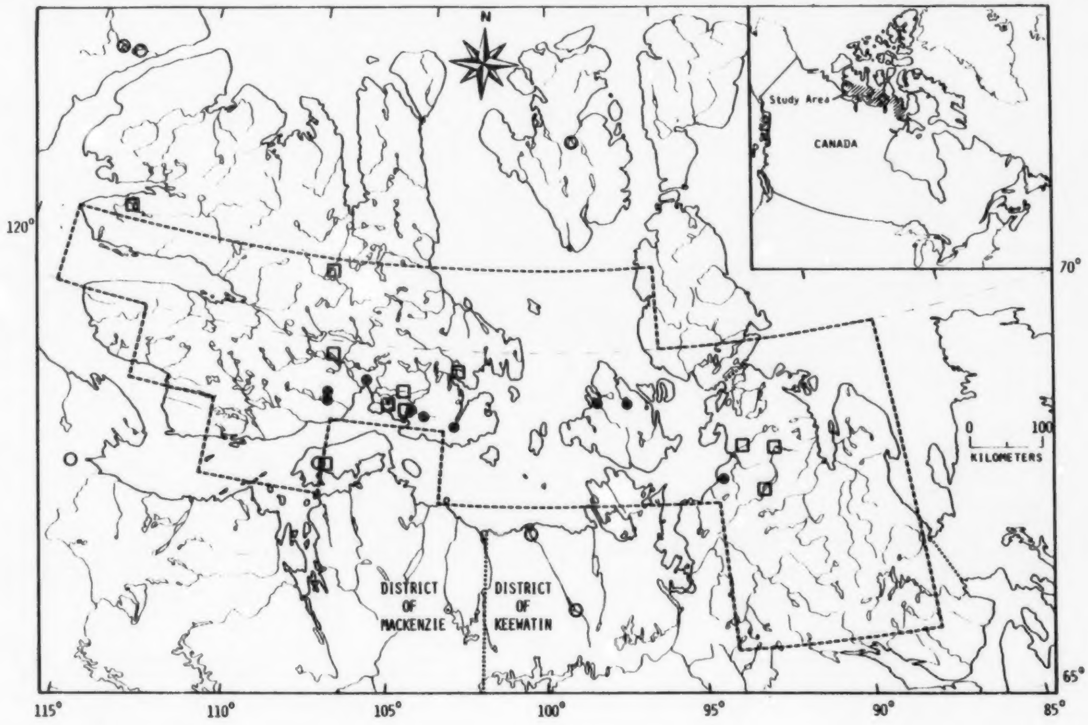
Figure 22. Distribution of broad whitefish *Coregonus nasus*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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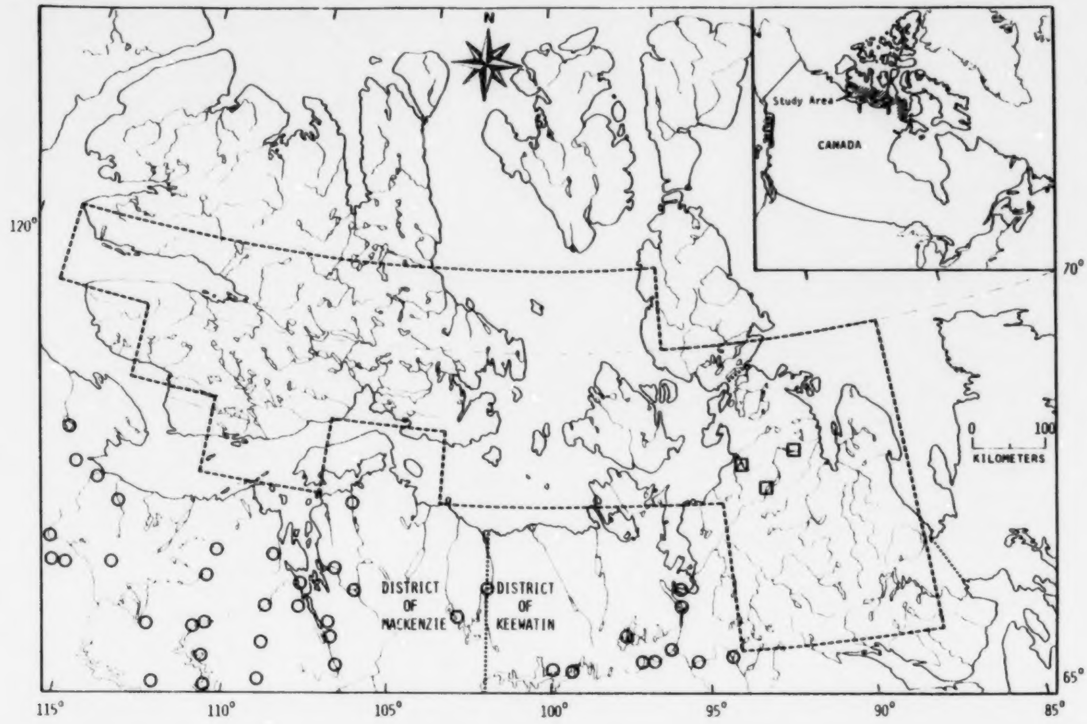
Figure 23. Distribution of least cisco *Coregonus sardinella*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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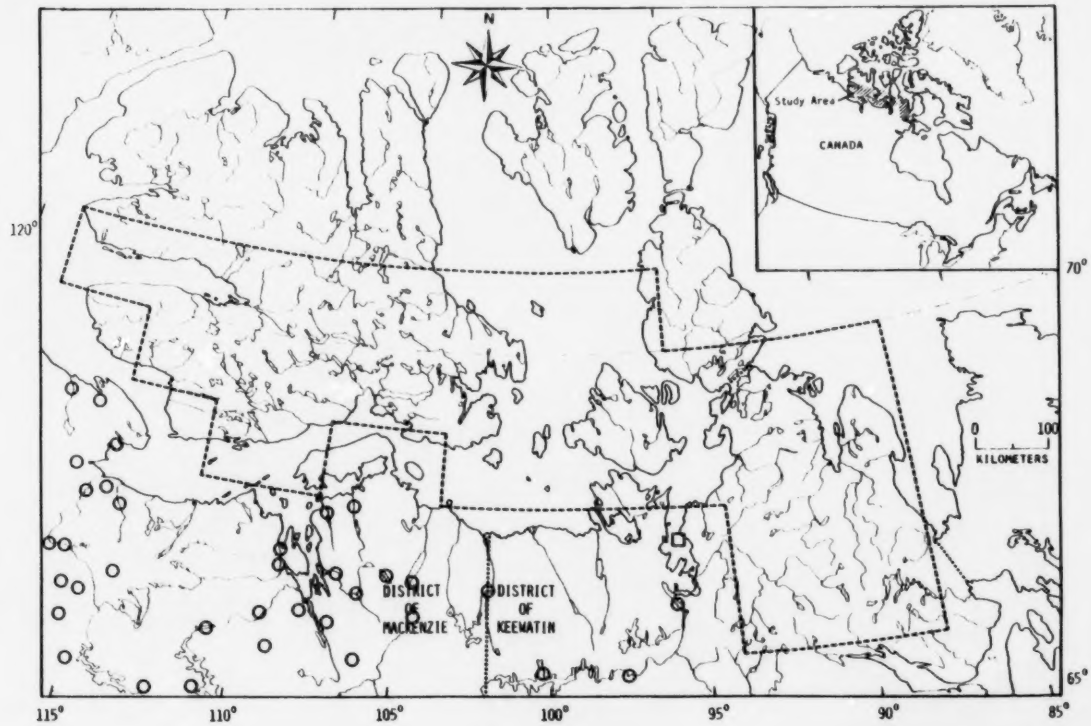
Figure 24. Distribution of round whitefish *Prosopium cylindraceum*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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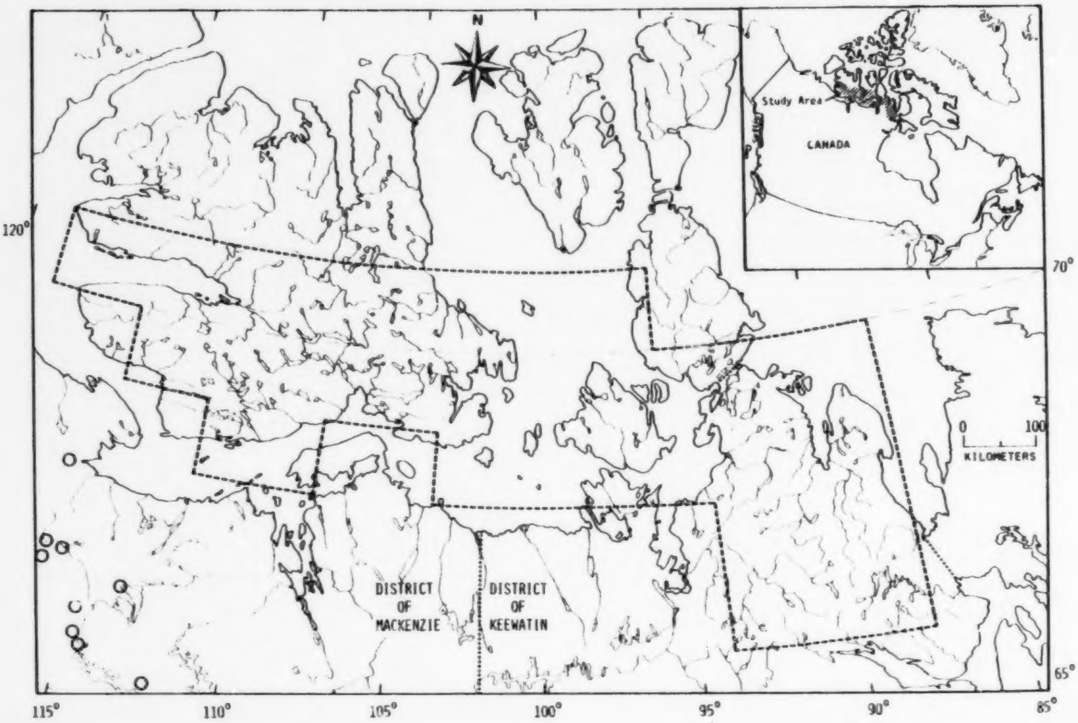
Figure 25. Distribution of Arctic grayling *Thymallus arcticus*.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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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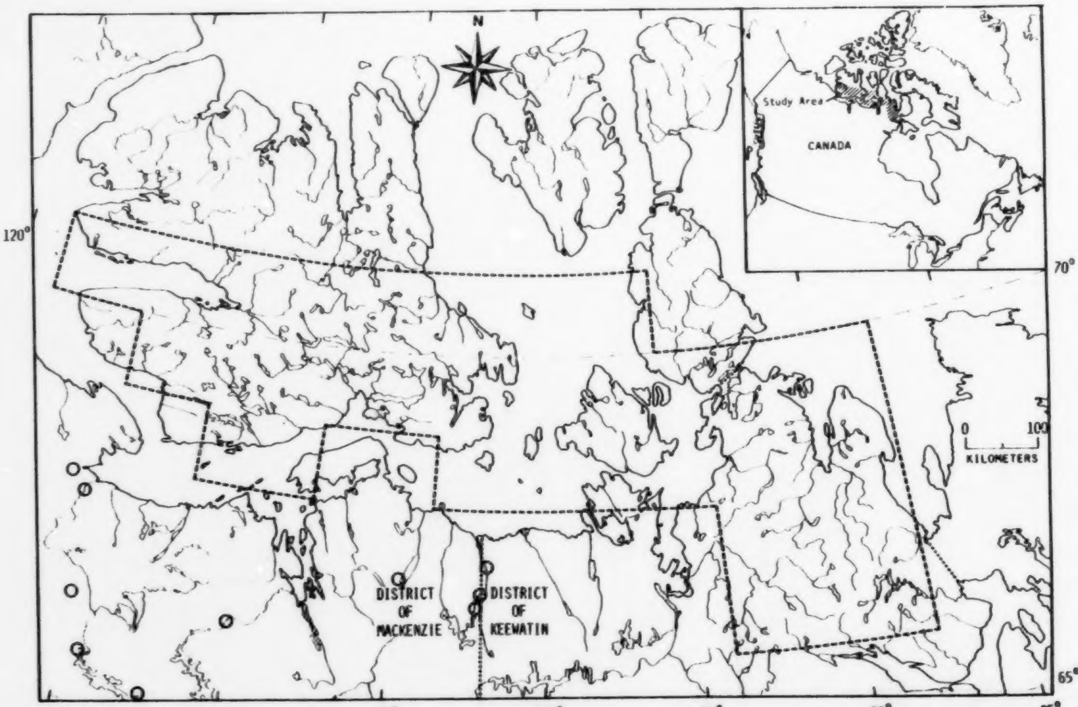
Figure 26. Distribution of northern pike *Esox lucius.*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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
65°
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95°
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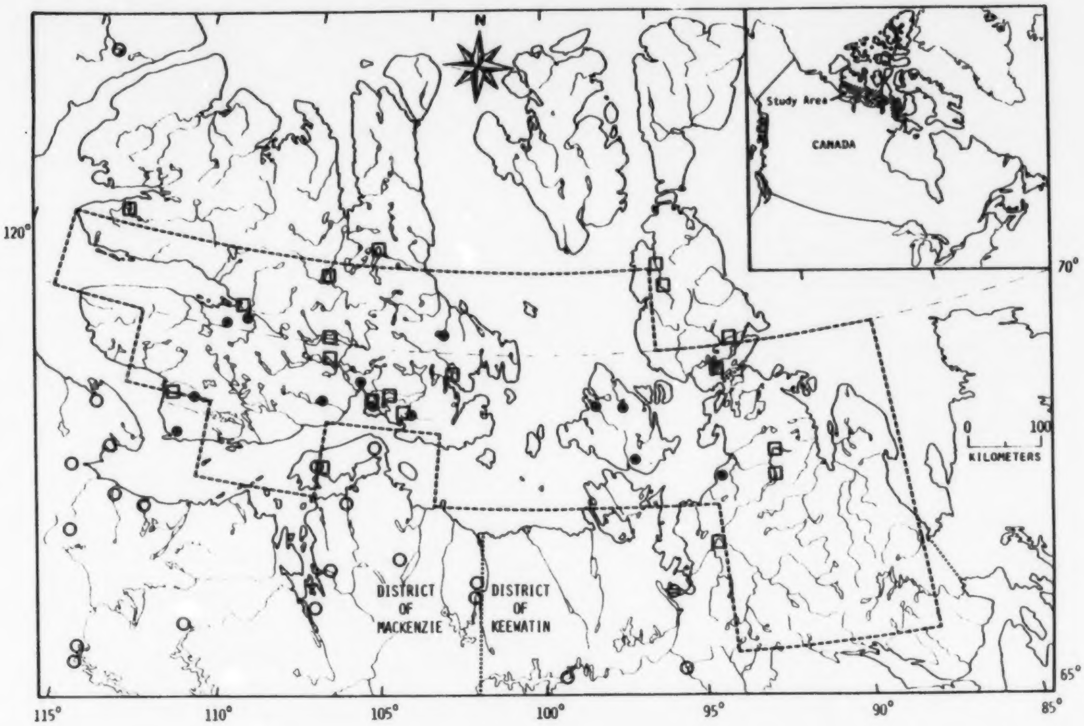
Figure 27. Distribution of longnose sucker *Catastomus catastomus.*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Study Area
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KILOMETERS
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DISTRICT OF KEEWATIN
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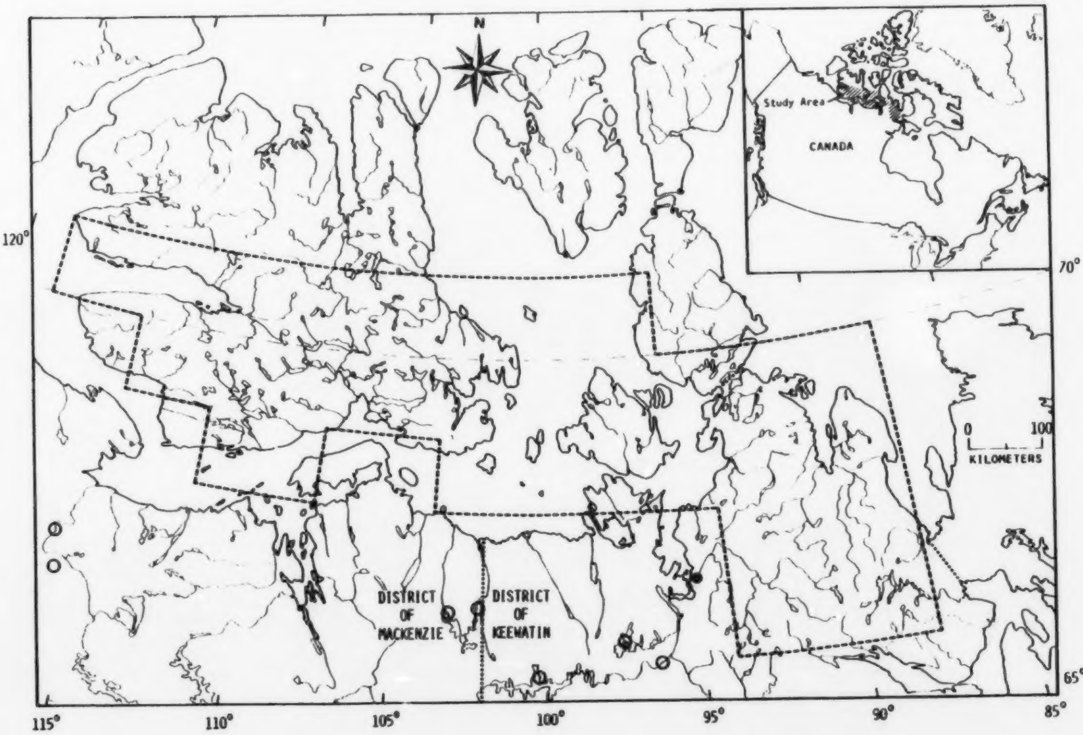
Figure 28. Distribution of ninespine stickleback *Pungitius pungitius*.


N
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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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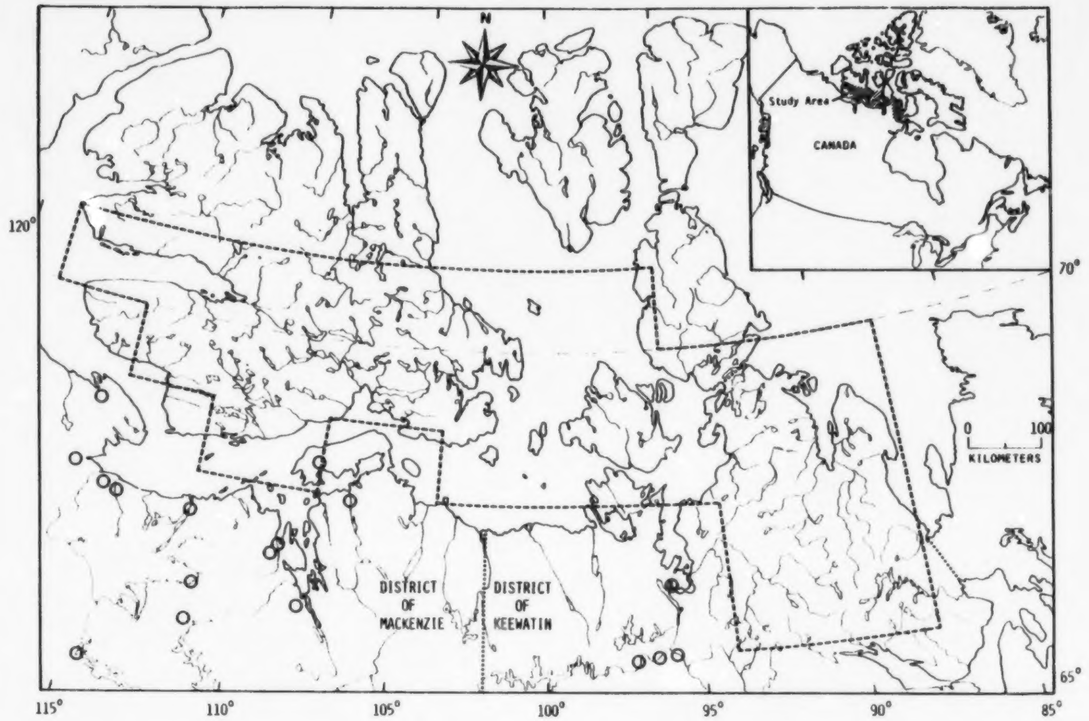
Figure 29. Distribution of burbot *Lota lota*.


N
Study Area
CANADA
120°
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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
65°
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110°
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100°
95°
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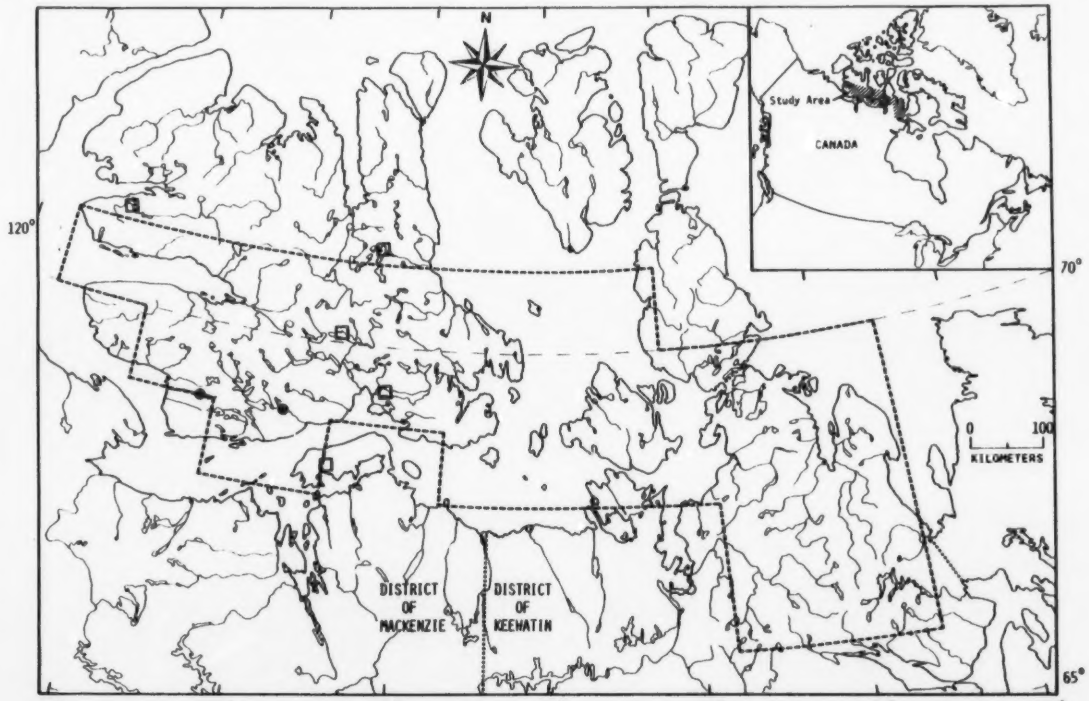
Figure 30. Distribution of slimy sculpin *Cottus cognatus*.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Study Area
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KILOMETERS
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
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85°

Figure 31. Distribution of fourhorn sculpin *Myoxocephalus quadricornis*.

APPENDIX III. FISH DATA

- Explanation of tables
- Victoria Island
- King William Island
- Northeastern Keewatin
- Diet summary
- Parasite distributions

EXPLANATION OF TABLES 17 TO 19

Symbols used in the tables:

* Water chemistry and zooplankton taken at this site.
[1] Specimens available at National Museum of Natural Sciences, Ottawa.
[2] See miscellaneous food items category below.
[3] See miscellaneous metazoan parasite table for unlisted parasite species.
+ Stomach: presence of most abundant food items.
+ Parasites: presence of parasite species.
- not examined.

Sexual maturity was assessed through gonad examinations and coded according to the following scale:

Male	Female	Development
1	7	immature
2	8	mature
3	9	near ripe
4	10	ripe
5	11	ripe and running
6	12	spent
0		sex indistinguishable

Classification system for fish diet analysis:

points allotted	fullness of stomachs (apparent)
0	0 (empty)
<1	
1	
2	
4	¼
8	½
16	3/4
20	1 (full)

Miscellaneous food items category for Tables 17 to 19 includes:

Item	Site	Contribution to Diet	Fish Species
Table 17.			
unidentified insects	6, 23	<1	Arctic charr, lake trout, least cisco
Valvatidae (Gastropoda)	4, 15	1, 2, 4	lake trout, least cisco
Hydracarina	3, 4, 12, 14-16, 18	<1, +	lake trout, Arctic charr
bird feathers	3, 16	<1	lake trout
pebbles	6	<1	lake trout
Ostracoda	12, 15	<1	Arctic charr, least cisco
Plecoptera	16	<1	lake trout
unidentified crustacean	6	<1	lake trout
Tipulidae	16	1	Arctic charr
Hymenoptera	6	<1	lake trout
Nematoda (Mermithidae)	3, 25, 27	<1, +	lake trout, Arctic charr, least cisco
detritus	15	+	Arctic charr
Ephemeroptera	18	+	Arctic charr
beetle	4	+	lake trout
Diptera	14	<1, 1, 2	least cisco
plant material	3, 4, 6, 16, 23	<1, 1, 4	Arctic charr, lake trout
Table 18.			
Amphipoda	1	<1	Arctic charr
Hydracarina	6	<1, 1	least cisco
Ostracoda	6	<1	least cisco
Sphaeriidae	6	<1	least cisco
Nematoda (Mermithidae)	6	<1, +	least cisco
fish remains	1, 6	+	lake trout, Arctic charr
Table 19.			
Hymenoptera	3, 4	+	lake trout
Plecoptera	3	2	lake trout
Ephemeroptera	3	2	lake trout
Hydracarina	3	<1	lake trout
plant material	3	1	lake trout
kelp	2	+	Arctic staghorn sculpin

Number classification for parasite levels of infection:

number	number of parasites
1	1 - 25
2	26 - 50
3	51 100
4	101 - 200
5	201 - 500
6	501 - 1000
7	1001 - 2000
8	>2000

Miscellaneous metazoan parasites not listed in Tables 17 and 19.

Host	Parasite	Site	Fish	Infection level
Victoria Island (Table 17)				
Arctic charr	*Salmincola carpionis*	13	6[4]	1
	Cyathocephalus truncatus	15	2	1
	Cystidicola farionis	15	2	1
	Cystidicola farionis	15	3	1
	Cystidicola farionis	15	5	1
	Cestoda[5]	16	7	1
	Cestoda	21	6	1
	Cestoda	21	8	1
	Cestoda	24	12	1
	Acanthocephala	24	21	1
	Acanthocephala	24	22	1
	Cestoda	24	32	1
	Cestoda	24	35	1
	Cestoda	25	1	1
	Salmincola carpionis	27	2	1
Lake trout	*Proteocephalus arcticus*	4	1	1
	Acanthocaphala	4	3	1
	Acanthocephala	4	5	1
	Proteocephalus arcticus	4	14	4
	Crepidostomum farionis	4	14	1
	Acanthocephala	4	17	1
	Acanthocephala	4	20	1
	Cestoda	11	3	1
	Cestoda	11	5	4
	Cestoda	11	6	3
	Cestoda	11	7	2
	Cestoda	11	9	1
	Cestoda	12	1	1
	Cestoda	15	1	1
	Cestoda	16	5	1
	Cestoda	22	1	1
	Acanthocephala	22	3	3
	Acanthocephala	22	5	3
	Acanthocephala	22	6	1
	Acanthocephala	22	7	2
	Cestoda	22	8	1
	Acanthocephala	22	9	2
	Acanthocephala	22	10	1
	Acanthocephala	25	1	1
	Cestoda	25	1	1
	Cestoda	25	3	1
	Cestoda	25	4	+
	Acanthocephala	25	4	2
	Acanthocephala	25	10	2
	Cestoda	25	10	1
Least cisco	*Proteocephalus exiguus*	14	+	1-5
	Crepidostomum farionis	14	+	1
	Crepidostomum farionis	15	6	1
	Crepidostomum farionis	15	7	1
	Cyathocephalus truncatus	15	12	1
Northeastern Keewatin (Table 19)				
Arctic charr	*Salmincola edwardsii*	3	1	1
	Thynnascaris adunca	11	2	1
Burbot	*Salmincola lotae*	7	1	1
	Salmincola lotae	7	3	1

[4] i.e. *S. carpionis* infects the 6th Arctic charr listed at site 13 on Victoria Island, etc.

[5] parasites not collected for identification

+data summarized in text

Table 17. Data from Arctic charr *Salvelinus alpinus*, lake trout *S. namaycush*, least cisco *Coregonus sardinella*, ninespine stickleback *Pungitius pungitius*, fourhorn sculpin *Myoxocephalus quadricornis*, and fish doctor *Gymnelis viridis* caught in 1982 on southern Victoria Island, N.W.T.

						Stomach Contents[2]														Parasites[3]									
Site (Fig. 6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
Arctic charr																													
1*	unnamed lake 70°12.5'N, 111°00'W 4-5/8/82, 19.5 h gillnets (V5, 6)	no fish in either net																											
8*	unnamed lake 68°34'N, 112°59'W 5-6/8/82, 16.5 h gillnets (V11, 12)	no fish in either net																											
9	unnamed lake 68°31.5'N, 112°41'W 5-6/8/82, 16.5 h gillnets (V9, 10)	no fish in either net																											
12	unnamed lake 69°05'N, 109°32'W 6-7/8/82, 24 h gillnets (V13, 14)	391	590	8	7	½	4	1					<1			4		<1	<1										
13*[3]	unnamed lake 69°18.5'N, 108°04'W 7-10/8/82, 66 h gillnet (V20)	332	510	7	5	0																							
		314	385	7	7	½											+												
		361	600	1	6	1	+	+		+					+			+		1									
		329	46[illegible]	1	6	½									+		+												
		301	[illegible]0	1	-	1			+																				
		196	72	7	4	½											+												
		330	460	1	-	1				+					+			+											
		188	60	7	3	0														1									
	as above, 66 h gillnet (V19)	326	440	1	5	1			+																				
		302	350	1	6	1											+												
		390	750	2	7	1											+									1			
		246	170	7	5	½			+																				
		214	105	-	-	-														-									
		216	118	7	4	½											+			1									
		136	24	-	3	-														-									
		-	-	-	-	-														-									
		183	70	-	3	-														-									
		220	-	-	-	-														-									
		208	82	-	4	-														-									
		175	60	-	3	-														-									
14[1]	stream 69°18'N, 108°03'W 7-10/8/81, 66 h hoopnet (VH9u)	75	3.6	0	-	-														-									
		70	3.3	0	-	-														-									
		74	4	0	-	-														-									
		70	3.6	0	-	-														-									
		79	4.2	0	-	-														-									
		71	3.4	0	-	-														-									
		77	4.0	0	1	-														-									
		67	2.6	0	-	-														-									
		75	3.9	0	-	-														-									
		125	16.1	0	-	-														-									
		130	19.3	0	-	-														-									
		115	12.6	0	-	-														-									
		99	8.6	0	2	-														-									
		109	11.3	0	-	-														-									
		190	72.6	0	4	-														-									
		155	34.6	0	4	-														-									
		180	57.4	0	-	-														-									
		166	47.3	0	-	-														-									
	as above, 66 h hoopnet (VH10d)	364	569	2	-	-																							
		365	609	2	-	-																							
		69	2.9	0	1	1		+																					
15[3]	Halovik River 69°17'N, 108°02'W 7-10/8/82, 66 h gillnets (V17, 18)	513	1360	8	12	0																							
		557	1875	2	18	1											+			1									
		545	1730	9	14	½											+			1					1				
		218	92	1	4	½											+												
		519	1340	2	13	1	+	+																					
		510	1460	9	12	1												+	+										

Table 17. Cont'd.

Site (Fig. 6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach Contents[2]														Parasites[3]									
						Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
16[3]	unnamed lake	320	390	1	7	½	<1	1	1									1	1	2									
	69°33'N, 107°04'W	192	62	1	3	1	4	8	8																				
	10-11/8/82, 20.5 h	177	52	7	3	0																							
	gillnet (V21)	152	30	1	3	½	+	+												1									
		105	8	1	2	1	+	+																					
	as above, 20.5 h	485	1500	8	15	1	+	+												1		1	1	1	1		1		
	gillnet (V22)	413	800	1	7	½								+						1					1				
17*[1]	unnamed lake	97	10.1	0	-	-														-									
	69°35'N, 106°58'W																												
	10-11/8/82, 21 h																												
	gillnet (V24)																												
18[1]	stream	81	5.3	0	2	-																							
	69°30'N, 106°42'W	77	4.8	0	-	-														-									
	10-11/8/82, 21 h	87	7.2	0	-	-														-									
	hoopnets (VH11, 12)	105	12.4	7	3	-														-									
		100	10.3	0	-	-														-									
		103	10.3	0	-	-														-									
		101	10.5	0	-	-														-									
		97	9.5	0	2	0														-									
		116	15	0	-	-														-									
		110	14	0	-	-														-									
		118	17	1	3	½	+	+											+	-									
		120	20.5	0	-	-														-									
		121	18	0	-	-														-									
		115	16.5	1	3	½	+	+												-									
		133	27.5	1	3	0														-									
		144	35	0	-	-														-									
		132	23	0	-	-														-									
19[1]	outlet to Kitiga L.	110	13.1	1	-	-																							
	69°16'N, 105°55'W	141	34.4	1	-	-																							
	27-28/8/82, 21 h	286	247	1	-	-																							
	hoopnets (VH15, 16)	283	232	7	-	-																							
		279	229	1	-	-																							
		285	263	1	-	-																							
20	Freshwater Creek	509	1460	2	13	1										+				1	4	1			1				
	69°12.5'N, 104°47'W	468	1000	2	11	0														1	2			1	1		1	1	
	Weir, 31/8-1/9/82	708	3900	2	15	1										+				1	5								
		487	1150	8	9	0															1					1	1		
		431	800	2	-	0															5						5		
		489	1100	8	11	0														1	1				1	1	1		
		304	300	7	5	0															2						1		
		335	450	1	6	½															1	1		1			4		
		287	200	1	5	0														1	1	1					4		
21[3]	stream	80	4.8	0	-	-																							
	69°12.5'W, 104°47'W	581	2280	2	12	0														2	1				1				
	27-28/8/82, 20 h	552	1800	8	13	0																							
	hoopnets (VH17, 18)	533	1575	8	14	0														1									
	(45 charr released,	482	1075	8	9	-														1									
	39 fish moving	504	1375	8	15	-														2		1							
	upstream)																												
22	unnamed lake	613	2650	3	12	0																							
	69°12.5'N, 104°45'W	550	1590	10	13	0																							
	27-28/8/82, 20.5 h	485	1320	8	11	0														1									
	gillnet (V33)																												
23*	unnamed lake	236	132	1	5	1		<1	16			2	1						<1										
	69°11'N, 104°40'W	295	250	7	8	½		+		+	+										1					1	2		
	27-28/8/82, 20.5 h	227	112	1	6	0																1							
	gillnet (V34)	478	1170	9	11	0														1									
		538	1780	2	13	½			+					+															
		160	55	7	3	1																			1		1		

Table 17. Cont'd.

Site (Fig.6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach Contents[2]														Parasites[3]									
						Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
24[3]	unnamed lake	104	10	-	3	-																							
	69°00'N, 103°21'W	120	15	7	-	0																							
	13-15/8/82, 45 h	101	12	1	2	1											+												
	gillnet	125	20	3	5	0																							
		184	52	1	5	0																							
		111	11	1	3	0																							
		101	10	-	2	-																							
		101	10	1	2	0																							
		192	62	1	5	0																							
		108	12	1	3	0																							
		98	9	1	2	0																							
		475	1170	3	16	½	+	+												2									
		195	60	7	-	0																							
		180	50	7	5	0														1									
		202	72	1	5	0														1									
		244	142	1	7	1											+			1									
		182	52	1	4	½											+												
		228	110	7	4	0																							
		188	56	7	5	0																							
		232	116	7	7	0														1									
		470	880	2	17	0														1									
		410	620	2	15	1											+			1									
	as above, 45 h	137	22	3	-	1											+			1									
	gillnet (V32)	107	10	0	2	½											+												
		114	12	7	3	½		+																					
		96	7	0	3	0																							
		101	10	0	2	1											+												
		190	62	1	5	0																							
		174	47	7	-	0														1									
		193	64	7	5	0																							
		197	66	1	5	0																							
		275	204	1	8	1											+			1									
		274	176	7	8	½											+			1									
		410	680	2	12	1											+			1									
		458	900	8	13	0														2									
		474	900	2	13	½											+			2									
25[3]	unnamed lake	260	164	7	8	1	+	+											+										
	69°03'N, 103°17'W	212	84	7	4	½	+	+												1									
	13-15/8/82, 45 h	176	48	1	4	0																							
	gillnet (V29)	175	50	7	4	1	+	+												1									
		170	45	1	3	1	+	+																					
26[1]	stream	66	2.8	0	-	-														-									
	70°15.5'N, 103°39'W	63	2.3	0	-	-														-									
	11-13/8/82, 43 h																												
	hoopnets (VH13, 14)																												
27*[3]	unnamed lake	518	1310	3	12	½												+											
	70°18.5'N, 103°40'W	625	2550	9	19	-																							
	11-13/8/82, 43 h	520	1450	2	14	½					+													1	6				
	gillnets (V27, 28)																												
28*	unnamed lake	no fish in either net																											
	70°18.5'N, 103°18'W																												
	11-13/8/82, 43 h																												
	gillnets (V25, 26)																												
lake trout																													
3*	unnamed lake	505	1360	9	30	½	4	2							<1	1		1	<1	1			3						
	70°03'N, 111°17'W	665	2900	8	29	3/4	8	8											<1	1			3			1			
	4-5/8/82, 17 h	463	1050	2	19	½	+	+												1									
	gillnet (V7)	172	56	7	8	3/4	4	8	4					<1					<1	1		1	1						
		200	69	1	5	[illegible]														1									
	as above, 17 h	192	72	2	8	0														2									
	gillnet (v8)	507	1320	8	31	1	16	1	1	<1					1			1	<1	1			1						
		433	800	2	21	1	+	+												1			1						
		512	1140	3	29	3/4	16	<1											<1	1		1	3						
		477	1140	3	24	3/4	8	8							<1				<1	1			3						
		538	1600	8	30	½	2	2	2						1					1			2			1			
		502	1110	3	29	1		+							+			+		1			3						
		509	1250	8	29	1												+					2						

Table 17. Cont'd.

						Stomach Contents[2]														Parasites[3]									
Site (Fig. 6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
4*[13]	Tassijuak Lake	696	3900	3	23	¼	+	+	+							+			+	1					6		1		
	69° 06'N, 112° 32'W	556	1680	8	18	¼									+			+		1		1			3			2	
	3-4/8/82, 16 h	334	345	7	6	¼	2	<1	2		<1		<1						<1						1				
	gillnet (V3)	280	100	7	4	0																							
		380	500	1	-	0														1		1			1	1			
		275	210	7	6	¼	2	1	1		<1		1	<1															
		273	190	7	5	0																							
	as above, 16 h	93	8	1	2	½											+												
	gillnet (V4)	109	10	1	2	¼																							
		112	12	1	-	1																							
		111	11	1	-	1																							
		212	92	1	6	1							+																
		200	75	1	6	3/4	1	1	8		1		1						2						1				
		273	194	1	9	0																1				1	1		
		296	280	1	6	1																							
		364	485	1	6	¼																							
		245	150	1	9	0																			1				
		238	145	7	7	¼	1		1				1		<1				1						1				
		190	68	7	6	½	<1	<1	4				<1						4	1					1				
		180	54	7	6	0																			1				
6*	unnamed lake	170	54	1	7	¼			4				<1						<1										
	68°53'N, 112°02'W	715	3250	2	27	0														1								2	
	3-4/8/82, 16 h	546	2250	3	20	3/4		1	2			8			4				<1	1				1				4	
	gillnet (V1)	425	770	8	-	½	<1	1	1			4			2				<1									3	
		500	1680	3	15	½		1	8			<1			1			<1	<1	1				1				2	
	as above, 16 h	123	16	1	2	1											+			1									
	gillnet (V2)	96	8	1	2	½							+																
		108	13	7	2	¼											+												
		655	3000	-	38	1										+				1									
		500	1570	3	20	½		1	4			2			1			2	<1	1				1				1	
7[1]	stream	171	48	0	-	-														-									
	68°33'N, 113°03'W																												
	5-6/8/82, 16.5 h																												
	hoopnet (VH5d)																												
10[1]	stream	104	8	0	3	-														-									
	69°08'N, 109°40'W	97	8	0	-	-														-									
	6-7/8/82, 23.5 h	81	5	0	2	-														-									
	hoopnet (VH7u)	88	6	0	2	-														-									
		69	2.7	0	-	-														-									
		69	2.5	0	1	-														-									
		65	2.5	0	-	-														-									
		69	2.5	0	-	-														-									
		60	1.7	0	1	-														-									
		61	1.8	0	-	-														-									
	as above, 23.5 h	176	65	0	4	-														-									
	hoopnet (VH8d)	135	29.5	0	4	-														-									
		135	26.5	0	-	-														-									
		135	25	0	-	-														-									
		115	13.4	0	3	-														-									
		104	9.5	0	-	-														-									
		98	8.6	0	2	-														-									
		87	6.5	0	-	-														-									
		85	5.0	0	-	-														-									
		91	6.2	0	-	-														-									
		66	2.1	0	-	-														-									
		65	2.3	0	1	-														-									
	as above, 23.5 h	104	10	0	-	-														-									
	traps (VT4)	64	2.2	0	-	-														-									
11*[3]	unnamed lake	835	6100	2	60	¼										+				2		1			6			1	
	69°08 N, 109°39'W	283	198	7	9	¼	1	<1			2		2	<1						1		1			3				
	6-7/8/82, 24 h	253	172	1	11	½	+	+																	4				
	gillnet (V15)	190	68	0	7	0																			1				
		545	2150	3	24	0														1					6			1	
		602	2700	3	45	½	1	1			1	1						4		1				1	4			4	
		570	2600	3	26	1	+	+										+		1					8			1	

Table 17. Cont'd.

						Stomach Contents[2]														Parasites[3]									
Site (Fig.6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
	as above, 24 h	700	3950	8	25	1										+				2					7			1	
	gillnet (V16)	170	50	1	7	0																			1			1	
		207	78	1	7	0														1					2				
12[13]	unnamed lake	572	2380	3	26	0														1								1	1
	69°05'N, 109°32'W	635	2360	2	31	0														1		1	1		3			1	
	6-7/8/82, 24 h	532	1535	8	20	0														1		1			1			2	
	gillnet (V13)	176	58	3	9	3/4			16																				
		101	10	0	2	0																							
		105	11	0	3	1	+	+																					
	as above, 24 h	99	9	0	-	-														-									
	gillnet (V14)	100	9.5	0	-	-														-									
15[3]	Halovik River	937	7800	8	-	0														1					1				
	69°17'N, 108°02'W	764	4050	8	34	-																			+			+	
	7-10/8/82, 66 h	575	2450	-	20	½											+			1					1				
	gillnet (V17)																												
16[3]	unnamed lake	786	6100	3	20	¼										+				1					5				1
	69°33'N, 107°04'W	518	1750	9	15	1	20	<1				<1							<1			1		1	5			4	
	10-11/8/82, 20.5 h	494	1220	7	14	1	+	+												1		1			1				
	gillnet (V22)																												
	as above, 20.5 h	560	1820	7	13	1										+						1	1		1				
	gillnet (V21)	530	1400	7	14	¼			+											1					1				
21	stream	470	1000	2	14	0														2					3				
	69°12.5'N, 104°47'W	3 fish released																											
	27-28/8/82, 20 h																												
	hoopnet (VH18u)																												
22[3]	unnamed lake	600	2220	11	31	0														1					2		1	1	1
	69°12.5'N, 104°45'W	450	1140	5	20	0																			2		3	1	
	27-28/8/82, 20.5 h	270	560	7	12	0																			2	1			
	gillnet (V33)	378	670	2	13	¼											+							3			5		
		350	400	2	13	0																			1				
		302	315	7	13	¼					+							+							2				
		286	250	7	9	¼		+							+					1					2				
		291	245	7	11	0														1					2				
		252	180	1	8	½					+														1	1			
		238	150	7	8	½					+				+										1				
23*	unnamed lake	500	1690	8	20	0																		1	8	1			
	69°11'N, 104°40'W	469	1010	11	17	0																			3		2		
	as above, 20.5 h	390	660	7	12	¼		<1				4			<1					1		1		1	1		1		
	gillnet (V34)																												
25[3]	unnamed lake	530	1850	8	17	½				+		+						+							1				
	69°03'N, 103°17'W	690	2850	8	29	0																			2				
	13-15/8/82, 45 h	506	1700	9	23	¼			+			+				+									2				
	gillnet	595	2700	9	19	0																			1				1
	as above, 45 h	182	60	[illegible]	4	0																							
	gillnet	200	74	[illegible]	6	0																							
		184	59	7	4	0																							
		165	40	7	5	0																							
		115	12	1	2	0																							
		573	2150	9	30	¼		+																	1				
27*	unnamed lake	501	1450	9	24	½					+													1	2		1		
	70°18.5'N, 103°40'W	565	1750	8	29	½					+											1			2		2		
	11-13/8/82, 43 h	479	1050	3	32	¼		<1										4		1		1		4	1		3		
	gillnet	470	1250	9	21	½		+	+		+														2		1		
		665	2600	8	38	0														1		1			2		1		1
	as above, 43 h	563	1480	8	27	1		4			<1				<1			16		1		1		5	4		5		1
	gillnet (V27)	503	1420	3	38	0																1		1	6	1	3		
		515	1380	9	26	¼		1			2							2		1				1	5		4		
Least cisco																													
13*	unnamed lake	95	3	0	-	-														-									
	69°18.5'N, 108°04'W	95	3	0	-	-														-									
	gillnet (V20)																												
14	see below																												

Table 17. Cont'd.

Site (Fig.6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
						Stomach Contents[2]														Parasites[3]									
15[13]	Halovik River 69°17'N, 108°02'W 7-10/8/82, 60 h gillnet (V17)	495	1330	8	16	1		+							+					1									
		509	1760	8	16	1											+												
		491	1200	3	15	1	+	+												1									
		108-143	(10 fish in poor condition)			-														-									
		117	(3 fish in poor condition)			-														-									
	as above, 60 h gillnet (V18)	430	900	9	11	3/4	4	2					1	8						1								1	
		491	1340	9	23	0														1								1	
		419	820	3	10	-														1								+	
		413	815	8	9	1											+												
		425	830	3	12	1											+												
		456	1100	9	11	1	+	+												1								2	
		476	1210	9	13	3/4		<1				4	1		8			1	2	1								+	
		420	790	8	11	¼											+			1									
		126	10	0	2	-														-									
		123	12	0	2	-														-									
		119	-	0	2	-														-									
18[1]	stream 69°30'N, 106°42'W 10-11/8/82, 21 h hoopnet (VH12d)	60	1.8	0	1	-														-									
		80	4.6	0	1	-														-									
		116	13.3	0	2	-														-									
		112	12.1	0	2	-														-									
21[1]	stream 69°12.5'N, 104°47'W 27-28/8/82, 10 h hoopnets (VH17, 18)	43	0.7	0	-	-														-									
		39	0.4	0	-	-														-									
		38	0.3	0	-	-														-									
22	unnamed lake 69°12.5'N, 104°45'W 27-28/8/82, 20.5 h gillnet (V33)	144	25	7	2	½								8															
27*	unnamed lake 70°18.5'N, 103°40'W 11-13/8/82, 43 h gillnets (V29, 30)	99	10	1	1	0														1									
		418	980	9	10	1	+	+											+	2									

Diet Summary: 40 Stomachs Examined, 11 Empty

Parasite Summary: 40 Fish Examined

Site	Sampling location	Number of Fish	Length (mm) Range (Mean)	Weight (g) Range (Mean)	Age (y)	Food Item	Total Points Allotted (% occurence)	Species	(%) Occurence	Infection Level
14[3]	stream 69°18'N, 108°03'W 7-10/8/82, 66 h hoopnet (VH9u, 10d)	97	54-90 (64.8)	1.2-6.1 (2.2)	1	Chironomidae	3 (13.8%)	*Diphyllobothrium ditremum*	5	1
						Diptera	4 (13.8%)	*Proteocephalus exiguus*	62.5	1
						Copepoda	352 (100%)	*Crepidostomum farionis*	5	1
						Hydracarina	<1 (3.4%)	*Metechinorhynchus salmonis*	7.5	1

Diet Summary: 7 Stomachs Examined, All Empty

Parasite Summary: 7 Fish Examined

Site	Sampling location	Number of Fish	Length (mm) Range (Mean)	Weight (g) Range (Mean)	Age (y)	Food Item	Total Points Allotted (% occurence)	Species	(%) Occurence	Infection Level
		10	129-150 (136.5)	20-35.5 (25)	2-3			*Diphyllobothrium ditremum*	28.6	1
								Proteocephalus exiguus	85.7	1-5
								Crepidostomum farionis	42.9	1
								Metechinorhynchus salmonis	28.6	1

Ninespine stickleback

Site	Sampling location	
2[1]	stream 70°12.5'N, 111°02'W 4-5/8/82, 18.5 h hoopnets (VH3, 4) traps (VT2)	2 fish preserved
3*	unnamed lake 70°03'N, 111°17'W 4-5/8/82, 17 h gillnet (V7)	1 specimen found in trout stomach

Table 17. Cont'd.

Site (Fig.6)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach Contents[2]														Parasites[3]									
						Fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Amphipoda	Cladocera	Copepoda	Sphaeriidae	fish remains	digested remains	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Thynnascaris adunca*	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Metechinorhynchus salmonis*	*Salmincola edwardsii*
5[1]	stream 69°05.5'N, 112°36'W 3-4/8/82, 16 h hoopnets (VH1, 2) traps (VT1)	62 preserved, 69 released																											
7[1]	stream 68°33'N, 113°03'W 5-6/8/82, 16.5 h hoopnets (VH5, 6) traps (VT3)	4 preserved																											
10[1]	stream 69°08'N, 109°40'W 6-7/8/82, 23.5 h hoopnets (VH7, 8) traps (VT4)	115 preserved, 155 released.																											
14[1]	stream 69°18'N, 108°03'W 7-10/8/82, 66 h hoopnets (VH9, 10) traps (VT5)	220 preserved, 800 released																											
18[1]	stream 69°30'N, 106°42'W 10-11/8/82, 21 h hoopnets (VH11, 12) traps (VT6)	4 preserved																											
19[1]	outlet to Kitiga L. 69°16'N, 105°55'W 27-28/8/82, 21 h hoopnets (VH15, 16) traps (VT8)	4 preserved																											
21[1]	stream 69°12.5'N, 104°47'W 27-28/8/82, 20 h hoopnets (VH17, 18) traps (VT9)	14 preserved																											
26[1]	stream 70°15.5'N, 103°39'W 11-13/8/82, 43 h hoopnets (VH13, 14) traps (VT7)	67 preserved																											
Fourhorn sculpin																													
4*[1]	Tassijuak Lake 69°06'N, 112°32'W 3-4/8/82, 16 h gillnet (V4)	106	8	-	-																								
12[1]	unnamed lake 69°05'N, 109°32'W 6-7/8/82, 24 h gillnet (V14)	81 83	4 4	0 0	- -																								
Fish doctor																													
20[1]	Freshwater Creek 69°08.5'N, 104°58'W weir, 26/8/82	114 found in mouth of charr	14.3	0	-																								

*123+- see start of Appendix III for explanation of tables.

Table 18. Data from Arctic charr *Salvelinus alpinus*, lake trout *S. namaycush*, least cisco *Coregonus sardinella*, and ninespine stickleback *Pungitius pungitius* caught in 1982 on King William Island, N.W.T.

Site (Fig. 9)	Sampling location, Date, Set time, Gear	Lenght (mm)	Weight (g)	Sex	Age (y)	Stomach Contents²												Parasites						
						fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Cladocera	Copepoda	algae balls	plant material	digested remains	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus exiguus*	*Bothrimonus sturionis*	*Cyatidicola cristivomeri*	*Echinorhynchus* sp.	*Salmincola carpionis*
Arctic charr																								
1*	Tasekyoak Lake 68°47'N, 96°38'W 15-16/8/82, 19 h gillnet (KW3)	320	345	1	8	0													1			2	1	
		334	355	1	8	0													1			2	1	
		331	385	7	7	0													1			2		
		270	190	7	6	3/4	<1	<1				16	<1				<1	1						
		123	14	1	3	1	+	+																
		355	465	1	8	3/4			1	16								1						
		442	800	2	9	1				+									1					
		440	940	8	8	1				20		<1						1						
		410	690	2	11	½	+	+																
		470	980	2	15	½	+	+		+								1	1			1		
		457	930	8	14	1	+	+		+								1	1					
	As above, 19 h gillnet (KW4)	452	990	8	13	0												1						
		528	1 330	2	21	¼				+				+				1						1
		469	980	2	-	½	+	+										3				2	1	
		330	365	2	7	1	+	+						+								1	1	
		350	480	7	9	0												1				1		
		293	265	7	8	¼																	1	
		283	255	1	7	½	+	+								+						2	1	
		387	615	7	7	½				+				+					1					
		453	980	8	14	½	+	+								+								
		323	350	1	8	3/4	1	4		8				1	1			1	1				1	
		330	360	7	9	0													1				1	
		295	245	7	7	0													1					
		315	397	2	9	1	+	+								+								
		469	1 040	2	12	½		<1		8					<1			1				1		
2¹	Stream entering Tasekyoak Lake. 68°46'N, 96°46'W 15-16/8/82, 19 h hoopnets (KWH1, 2) (subsample of 55 charr)	120	17.5	7	-	-												-						
		95	8.5	7	-	-												-						
		84	6.8	0	-	-												-						
		97	8.7	7	-	-												-						
		93	8.3	7	-	-												-						
		316	359	8	-	1					+													
		316	340	1	-	1				+	+													
3	Douglas River 68°42'N, 97°08'W 15-16/8/82, 21 h gillnets (KW1, 2)	No fish in either net.																						
4	Unnamed lake 69°10'N, 98°26'W 16-17/8/82, 19.5 h gillnets (KW5, 6)	No fish in either net.																						
6*	Unnamed lake 69°23'N, 98°12'W 16-17/8/82, 19.5 h gillnet (KW7)	399	600	3	14	1	+			+								1						
		300	300	8	10	1	+	+		+														
		373	500	8	14	½		+		+														
		280	230	7	7	¼											+							
		374	620	9	13	½										+								
		394	520	8	13	1										+								
		285	250	8	6	1	+	+		+							+	4						
		260	145	8	7	¼	+	+																
		252	144	7	7	¼	+	+																
		277	185	7	6	0																		
	As above, 19.5 h gillnet (KW8)	268	230	7	8	½	+	+										2						
		351	550	8	7	0															1			
7*	Unnamed lake 69 17'N, 97 18'W 17-18/8/82, 22 h gillnets (KW9, 10)	580	2 300	2	20	1		+			+								1			2		

Table 18. Cont'd.

Site (Fig. 9)	Sampling location, Date, Set time, Gear	Lenght (mm)	Weight (g)	Sex	Age (y)	Stomach Contents²												Parasites						
						fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Cladocera	Copepoda	algae balls	plant material	digested remains	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus exiguus*	*Bothrimonus sturionis*	*Cystidicola cristivomeri*	*Echinorhynchus* sp.	*Salmincola carpionis*
8¹	Stream 69°17'N, 97°11.5'W 17-18/8/82, 24 h hoopnets (KWH3, 4) (subsample of 269 charr, 264 moving upstream).	197	80	7	-	0																		
		170	44	7	-	0																		
		215	107	7	-	0																		
		240	162	7	-	0																		
		184	67	7	-	0																		
		285	267	7	-	0																		
		317	399	7	-	0																		
9*	Unnamed lake 69°23'N, 96°38'W 17-18/8/82, 21 h gillnet (KW11)	99	6	0	3	0																		
		106	8	7	2	1		+																
		143	30	3	7	0																		
		386	570	8	13	1								+								4		
		358	400	2	13	0												1				2		
		448	870	3	19	0																5		
		270	160	7	9	0												1						
		485	830	8	-	0																5		1
		429	750	2	19	1								+				1				4		1
		445	780	8	17	0												2	1			5		
		277	210	1	10	½										+								
		427	600	8	20	0												1				4		
		400	510	2	20	0																4		
		119	14	7	4	0																		
		110	10	7	4	0																		
		395	490	2	19	½		+			+			+										1
	As above, 21 h gillnet (KW12)	112	14	3	5	0																		
		432	850	8	20	½		+			+			+								5		
		377	445	2	20	½		+						+				1						
		375	490	2	14	½	+											1				1		
		454	800	2	19	1					+			+				1				5		
		330	340	1	13	½										+			1					
		362	330	2	24	1	+																	1
		328	315	8	14	1	+															1		
		382	480	2	17	½	+											1						
		390	520	2	19	1	+												1			3		
		530	1 300	3	21	0												1	1					
		391	560	9	18	0													1					
		437	640	8	26	0												2				2		1
		364	445	8	-	½	+																	1
		415	620	8	17	0												1				5		
		360	295	7	17	1	+																	
		351	455	2	16	½	+											1				4		
		375	385	2	19	1	+											3	1					1
Lake trout																								
1*	Tasekyoak Lake 68°47'N, 96°38'W 15-16/8/82, 19 h gillnet (KW4)	607	2 450	8	27	½											+	5	1			5	1	
Least cisco																								
6*¹	Unnamed lake 69°23'N, 98°12'W 16-17/8/82, 19.5 h gillnet (KW7)	327	380	3	12	½				+								1						
		337	415	9	10	1	+	+									+	2						
		314	385	3	9	1								+		+		1						
		326	385	3	12	1				+				+				1						
		327	340	3	11	½	+	+																
		326	355	3	11	½	+	+										1						
		331	410	9	14	½								+				1						
		327	330	9	10	½		+										1						
		333	405	9	13	1		+										1						
		310	285	3	10	½		+										1		1				
		327	400	9	11	½		+		+								1						
		276	210	3	9	½		+										1						
		275	200	3	8	0												1						
		299	210	9	11	0												1		1				
		311	285	3	14	0												2		5				
		316	340	9	11	½	1	1		2			4					1		6				
		282	285	3	10	½		1					4					1		4				
		316	330	3	13	1	4			16			1					1		2				
		345	420	3	13	1	4			16								2		1				
		126	18	1	2	3/4	4	4					8					2		1				
		126	16	1	2	1	8						8					3		1				

Table 18. Cont'd.

Site (Fig. 9)	Sampling location, Date, Set time, Gear	Lenght (mm)	Weight (g)	Sex	Age (y)	Stomach Contents[2]												Parasites						
						fullness	Chironomidae pupae	Chironomidae larvae	Trichoptera	Notostraca	Mysidacea	Cladocera	Copepoda	algae balls	plant material	digested remains	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus exiguus*	*Bothrimonus sturionis*	*Cystidicola cristivomeri*	*Echinorhynchus* sp.	*Salmincola carpionis*
6*[1]	Cont'd.	110	13	1	2	3/4	4	4					8					3		5				
		112	11	0	1	0												1						
		123	12	0	2	½	2	<1					2					2						
		120	12	0	-	½	4	<1					4					4		1				
		-	-	-	-	-												1						
		115	16	0	2	½	2	2					4					2		1				
	As above, 19.5 h gillnet (KWB)	260	175	3	7	1	+	+										1						
		330	387	9	14	1	8	8				1	2				1	2		2				
		308	285	9	10	1							+					1						
		233	125	2	6	1							+					1						
		308	270	3	11	½	2	2				<1	<1				<1	2						
		234	122	9	6	1				+			+					1						
		292	260	9	8	3/4	8	1		4		<1	1	2			<1	1						
		359	480	9	11	½	<1	<1		+		<1	<1	<1			<1	2						
		312	355	3	15	1	1	1		16			1	1				1						
		309	290	8	11	0												1						
		320	280	3	12	0												1						
		299	250	3	11	1							+					1						
		251	177	8	6	1							+					1						
		328	380	3	10	1	+	+		+								1		1				
		318	335	9	12	1	+	+		+								1						
		120	14	1	2	0												1						
		297	247	3	8	1	+	+										2		1				
		317	355	3	11	1	+	+		+								1						
		352	455	9	10	1	+	+		+			+				+	1						
		369	470	9	11	1		4		16										1				
		321	340	9	10	½	+	+					+					1		1				
		306	290	3	10	0												3		1				
		335	405	3	11	½	+	+					+					1						
		337	370	8	12	1	+	+									+	1		1				
		325	330	8	12	1	+	+										1						
		312	305	8	11	½	+	+		+								1		1				
		314	320	3	9	½	+	+		+								1						
		332	300	3	13	1	+	+						+			+	1						
		316	425	9	10	1	4			16			<1	<1			<1	1		3				
		315	325	3	11	3/4	4	4		8				<1			<1	1		3				
		324	440	9	12	3/4	8	2		1			4					1		4				
		290	245	3	9	½	2	2					4					1		5				
		330	390	9	12	3/4	4	4	1	1		1	2	4				1						
8[1]	Stream 69°17'N, 97°11.5'W 17-18/8/82, 24 h hoopnets (KWH3, 4) (Subsample of 26 cisco)	32	0.2	0	0	-												-						
		as above	8 fish			-												-						
		76	3.3	0	1	-												-						
		72	2.7	0	1	-												-						
		70	2.5	0	1	-												-						
		70	2.3	0	1	-												-						
		65	1.9	0	1	-												-						
		65	1.7	0	1	-												-						
		65	2.1	0	1	-												-						
		60	1.4	0	1	-												-						
		52	1.1	0	1	-												-						
		50	1.0	0	1	-												-						
		55	1.3	0	1	-												-						
		53	1.1	0	1	-												-						
		54	1.2	0	1	-												-						
Ninespine stickleback																								
2[1]	Stream entering Tasekyoak Lake 68°46'N, 96°46'W 15-16/8/82, 19 h hoopnets (KWH1, 2) traps (KWT1)	388 fish, 30 preserved.																						
5[1]	Stream 69°20.5'N, 98°11'W 16-17/8/82, 19 h traps (KWT 2)	4 fish, all preserved.																						
8[1]	Stream 69°17'N, 97°11.5'W 17-18/8/82, 24 h hoopnet (KWH4) traps (KWT3)	38 fish, 25 preserved.																						

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*[1,2]+- See start of Appendix III for explanation of symbols and table.

Table 19. Data for fish from northeastern District of Keewatin and adjacent coastal marine waters.

Site (Fig.12)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach Contents[2]															Parasites[3]								
						fullness	Chironomidae adults	Chironomidae pupae	Chironomidae larvae	Tipulidae	Diptera	Trichoptera	Mysidacea	Amphipoda	Copepoda	Isopoda	fish remains	digested material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Salmincola carpionis*	Cestoda
Freshwater and Searun Fishes																													
Arctic charr (*Salvelinus alpinus*)																													
1	Ford Lake 65°56'N, 90°48 W 20-21/8/82, 17 h traps (MLT1)	no fish																											
3[3]	Brown Lake 65°56'N, 91°05'W 19-20/8/82, 16.5 h gillnet (ML4)	675	2900	9	18	0																	1		4	1		1	
4*	unnamed lake 66°10.5'N, 90°56.5'W 19-20/8/82, 17 h gillnet (ML2)	490	1180	10	17	½			+	+											1								
		512	1500	4	17	0																	1						
		530	1500	4	17	0															1								
		244	148	1	5	0																							
		252	150	8	9	¼									+														
		108	12	3	4	-															-								
		101	9	3	4	-															-								
5*	Walker Lake 56°41'N, 90°31'W 21-22/8/82, 21 h gillnets (ML9, 10)	506	1440	5	18	0																							
		509	1050	2	21	¼	+		+												1								
6	unnamed lake 66°45'N, 90°19'W 21-22/8/82, 21 h gillnet (ML12)	480	1290	9	13	0															1								1
		97	10	3	6	0																							
		99	11	3	7	-																							
		90	8	3	5	-																							
		91	8	10	10	-																							
		101	9	2	6	-																				1			
		93	8.5	8	9	-																							
7	Hayes River 67°09'N, 95°04'W 2-8/9/82 commercial test fishery gillnets, 70 mm mesh	201 fish sampled, data summarized in text.																											
8	unnamed lake 67°36'N, 92°33'W 22-23/8/82, 20.5 h gillnet (ML14)	103	14	10	7	0															1								
		106	13	3	7	0																							
9*	Darby Lake 67°50'N, 92°32'W 22-23/8/82, 20.5 h gillnet (ML15)	107	13	3	4	0															2					1			
		107	14	7	6	0																							
	as above, 20.5 h gillnet (ML16)	104	13	3	5	0																							
		103	12	3	5	0																							
		110	14	9	11	0		+							+														
11[3]	Shepherd Bay 68°48'N, 93°38'W 24-25/8/82, 19 h gillnet (ML21)	441	1060	2	7	0																							
		572	2500	8	12	1											+					1					1		
12*	stream 69°02'N, 93°48'W 24-25/8/82, 20 h traps (MLT5)	no fish																											
	unnamed lake 69°01.5'N, 93°48'W 24-25/8/82, 20 h gillnet (ML19)	no fish																											
13	unnamed lake 69°03'N, 93°48'W 24-25/8/82, 20 h gillnet (ML20)	no fish																											

Table 19. Cont'd.

Site (Fig. 12)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach Contents[2]															Parasites[3]								
						fullness	Chironomidae adults	Chironomidae pupae	Chironomidae larvae	Tipulidae	Diptera	Trichoptera	Mysidacea	Amphipoda	Copepoda	Isopoda	fish remains	digested material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Salmincola carpionis*	Cestoda
Lake trout (*Salvelinus namaycush*)																													
3	Brown Lake	194	68	1	8	0															1								
	65°56'N, 91°05'W	215	102	1	9	½			+												1								1
	19-20/8/82, 16.5 h	134	22	1	5	0																							
	gillnet (ML4)	176	53	1	6	0															1		1	1					
		433	830	3	16	0															2								1
		459	850	3	14	0															1								1
		517	1280	2	33	1											+				1								1
		444	825	3	30	½	+														1								
		516	1280	3	28	½	+													+	1								1
		418	700	3	23	0															2								2
		316	470	7	14	1		1	2	8							4			5	1		1						
		331	385	2	12	1	+												+		1								1
		389	450	8	13	0															1								1
		315	310	1	14	1			+												1								+
		535	1550	3	25	0															1								1
		316	275	1	16	0															1								
		523	1590	9	30	0															1								1
		493	1120	8	24	0															1								
		607	2550	9	41	0																							1
	as above, 16.5 h gillnet (ML3)	442	820	3	27	0															1								1
4*	unnamed lake	102	9	1	3	½			+														1						
	66°10.5'N, 90°56.5'W	234	118	7	8	1			+												1		1						
	19-20/8/82, 17 h	380	490	7	12	1			+												1		1	1					
	gillnet (ML1)																												
	as above, 17 h	121	18	1	3	1			+																				1
	gillnet	183	60	7	6	0																							
		283	260	3	13	1			+												1								1
		319	355	2	12	1											+				1								1
		396	690	3	26	0																							
		384	520	2	17	½			+		+										1		1						
		423	680	2	19	0															3								
		485	980	2	20	¼					+	+								+	1								
5*	Walker Lake	409	710	8	29	½												+											1
	66°41'N, 90°31'W	424	740	3	30	1	+														1								2
	21-22/8/82, 21 h	435	900	2	27	¼	+														1			1					
	gillnet (ML9)	437	850	10	26	0															1								1
	as above, 21 h	298	260	1	12	¼	+														1								2
	gillnet (ML10)	475	890	8	31	¼	+																						3
		427	850	8	30	½	+														1								2
6	unnamed lake	413	720	1	18	0															1								1
	66°45'N, 90°19'W	440	890	2	23	0															2								
	21-22/8/82, 21 h	549	1900	3	25	0															1								1
	gillnet (ML12)	318	380	1	13	0															1								1
	as above, 21 h	460	1090	8	19	½											+				1								+
	gillnet (ML11)	402	520	8	16	0															1								
		443	1050	9	21	0															1								1
	as above, 21 h	71	3.7	0	-	-															-								
	traps (MLT2)	57	1.6	0	-	-															-								
		56	1.7	0	-	-															-								
		55	1.6	0	-	-															-								
7	Hayes River 67°09'N, 95°04'W 2-8/9/82 commercial test fishery, gillnets 70 mm mesh	34 fish sampled, data summarized in text.																											
8	unnamed lake	435	820	2	18	0															1								
	67°36'N, 92°33'W	706	2500	2	31	0															2								
	22-23/8/82, 20.5 h	332	420	7	15	½											+				1								1
	gillnet (ML13)	333	385	7	14	½			+												1								
	as above, 20.5 h	102	10	1	3	-															-								
	gillnet (ML14)	373	490	2	14	½	+														1								
9*	Darby Lake	430	990	10	21	0															1								
	67°50'N, 92°32'W	417	760	3	21	¼			+												1								2
	22-23/8/82, 20.5 h	347	490	8	15	0															1								1
	gillnet (ML15)	546	1870	2	27	0															1								
		220	102	7	9	0															-								
		102	10	1	2	0															-								

Table 19. Cont'd.

						Stomach Contents[2]															Parasites[3]								
Site (Fig. 12)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	fullness	Chironomidae adults	Chironomidae pupae	Chironomidae larvae	Tipulidae	Diptera	Trichoptera	Mysidacea	Amphipoda	Copepoda	Isopoda	fish remains	digested material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Salmincola carpionis*	Cestoda
	as above, 20.5 h	399	720	3	16	0															1								
	gillnet (ML16)	904	4650	8	>40	0															1								1
		379	650	3	16	0																							1
		440	910	3	18	¼	+																						1
		316	340	2	14	0																							1
		233	132	1	8	¼												+											1
		291	270	7	13	0																							1
		309	330	7	10	0															1								1
		422	920	3	18	0															1		1	1					
		538	1850	9	22	-															1								1
		407	560	3	17	¼	+														1								1
Arctic cisco (*Coregonus autumnalis*)																													
7	Hayes River	23 fish sampled, data summarized in text.																											
	67°09'N, 95°04'W																												
	2-8/9/82																												
	commercial test																												
	fishery, gillnets																												
	70 mm mesh																												
11	Shepherd Bay	440	1000	3	18	0															1	1							
	68°48'N, 93°38'W	439	850	3	15	0															+	1		1					
	24-25/8/82, 19 h																												
	gillnet (ML21)																												
Lake whitefish (*Coregonus clupeaformis*)																													
7	Hayes River	59 fish sampled, data summarized in text.																											
	67°09'N, 95°04'W																												
	2-8/9/82, commercial																												
	test fishery,																												
	gillnets 70 mm mesh																												
Least cisco (*Coregonus sardinella*)																													
10*	unnamed lake	97	8.1	0	2	-															-								
	68°23'N, 93°46'W	97	8.4	0	2	-															-								
	23-24/8/82, 20 h	97	7.6	0	2	-															-								
	gillnet (ML17)																												
Burbot (*Lota lota*)																													
7[3]	Hayes River	731	2380	2	18	¼											+												
	67°09'N, 95°04'W	756	3050	2	17	0																							
	2-8/9/82	758	2660	9	25	0																							
	commercial test																												
	fishery, gillnets																												
	70 mm mesh																												
Ninespine stickleback (*Pungitius pungitius*)																													
10*	stream	39 fish preserved																											
	68°23'N, 93°47'W																												
	23-24/8/82, 20.5 h																												
	traps (MLT4)																												
Marine Fishes																													
Capelin (*Mallotus villosus*)																													
2	Ford Lake	153 fish caught, 6 preserved																											
	65°55'N, 90°54'W	size ranges: 119-143 mm, 10-17 g, fish in spawning condition																											
	20-21/8/82, 17.5 h																												
	gillnets (ML5, 6)																												
Greenland cod (*Gadus ogac*)																													
11	Shepherd Bay	340	340	-	-	-															-								
	68°48'N, 93°38'W	294	225	-	-	-															-								
	24-25/8/82, 19 h	190	58	1	-	0																					1		
	gillnet (ML21)	390	550	8	-	¼											+												
		361	430	8	-	¼									+												4		
		383	610	8	-	1											+										4		
		434	780	8	-	1								+		+	+										3		
		520	1800	3	-	1											+										3		1

Table 19. Cont'd.

						Stomach Contents[2]															Parasites[1]								
Site (Fig. 12)	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	fullness	Chironomidae adults	Chironomidae pupae	Chironomidae larvae	Tipulidae	Diptera	Trichoptera	Mysidacea	Amphipoda	Copepoda	Isopoda	fish remains	digested material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Bothrimonus sturionis*	*Eubothrium salvelini*	*Proteocephalus* sp.	*Cystidicola cristivomeri*	*Philonema agubernaculum*	*Echinorhynchus* sp.	*Salmincola carpionis*	Cestoda
Fourline snakeblenny (*Eumesogrammus praecisus*)																													
2	Ford Lake 65°55'N, 90°54'W 20-21/8/82, 17.5 h gillnet (ML5)	180	54	-	-	-															-								
Arctic staghorn sculpin (*Gymnocanthus tricuspis*)																													
2	as above (ML6)	91	8.3	0	-	-															-								
		120	18.5	0	-	-															-								
		118	20	0	-	-															-								
		168	60	9	-	0															-								
		172	64	3	-	1															-								
		166	56	9	-	0															-								
		186	96	9	-	¼														+	-								
		215	118	9	-	0															-								
		194	80	3	-	0															-								
Spatulate sculpin (*Icelus spatula*)																													
2	as above	70	4	0	-	-															-								
		68	3.2	0	-	-															-								
Fourhorn sculpin (*Myoxocephalus quadricornis*)																													
11	Shepherd Bay 68°48'N, 93°38'W 24-25/8/82, 19 h gillnet (ML21)	45 fish sampled, data summarized in text size ranges: 210-302 mm, 82-260 g, fish preparing to spawn																											
Shorthorn sculpin (*Myoxocephalus scorpius*)																													
2	Ford Lake 65°55'N, 90°54'W 21-22/8/82, 17.5 h gillnet (ML6)	39 fish sampled, data summarized in text size ranges: 133-376 mm, 28-650 g, fish preparing to spawn																											
Ribbed sculpin (*Triglops pingelii*)																													
2	as above	13 fish sampled, data summarized in text size ranges: 91-144 mm, 4.5-24 g, fish preparing to spawn																											

*[1][2][3]+- see start of Appendix III for explanation of tables.

Table 20. Diet of fish species caught in the 1982 survey area (Fig. 1) during August and September.

Catch Data			Food Items																							
Species	Sampling Site	Number[1] of Fish Examined	Chironomidae (Diptera)	Tipulidae (Diptera)	Diptera	Trichoptera	Plecoptera	Ephemeroptera	Hymenoptera	Mysidacea	Amphipoda	Cladocera	Copepoda	Notostraca	Isopoda	marine Decapoda	Hydracarina	Valvatidae (Gastropoda)	marine Gastropoda	Sphaeriidae (Pelecypoda)	Mermithidae (Nematoda)	fish remains	algae balls	plant matter	digested material	miscellaneous[2]
Arctic charr	Victoria Island (Fig. 6)																									
	12	1	●									•					·					●	●			•
	13	13(2)	·			●								●						•			•		●	
	14	1	●																							
	15	6(1)	●																				●		●	•
	16	6(1)	●	•									●	●									·	•		
	18	4(2)	●					●									●									
	20	9(6)									●											●				
	21	4(4)																								
	22	3(3)																								
	23	6(2)	●						·	•	·	·	·	●						●				·		·
	24	34(21)	●																		●				●	
	25	6(2)	●																		●					
	27	2								●													●			
	King William Island (Fig. 9)																									
	1,2	27(7)	●			·				•	·	·	·	●								·	•	·	●	
	6	11(2)	●											●								●			•	
	7	1	●							●																
	8	7(7)																								
	9	34(16)	●							•													●		●	
	Keewatin (Fig.12)																									
	3	1(1)																								
	4	5(3)	●			●							●													
	5	2(1)	●																							
	6, 8, 9	6(6)																								
	7	200(144)																				●				
	11	2(1)																				●				
Lake trout	Victoria Island (Fig. 6)																									
	3	13(2)	●			•							·	·			·			●	·	•	●	·		·
	4	15(6)	●			●				·		●	·				·			·		•	·	·	•	·
	6	10(1)	·			●			·		●	·								•		·	·	·	●	·
	11	10(4)	●							●	·	•	·								·	●	●			
	12	6(4)	●			●																				
	15	2(1)																							●	
	16	5	●			●	·				•						·					●		·		•
	21	1(1)																								
	22	10(5)	●							●										•			•		●	
	23	3(2)	●								●									●						

Table 20. Cont'd.

Catch Data			Food Items																							
Species	Sampling Site	Number[1] of Fish Examined	Chironomidae (Diptera)	Tipulidae (Diptera)	Diptera	Trichoptera	Plecoptera	Ephemeroptera	Hymenoptera	Mysidacea	Amphipoda	Cladocera	Copepoda	Notostraca	Isopoda	marine Decapoda	Hydracarina	Valvatidae (Gastropoda)	marine Gastropoda	Sphaeriidae (Pelecypoda)	Mermithidae (Nematoda)	fish remains	algae balls	plant matter	digested material	miscellaneous[2]
Lake trout	Victoria Island (cont'd)																									
	25	10(7)	●			•					●			•								●	·			
	27	8(2)	●			•				●										•			●			
	Keewatin (Fig. 12)																									
	3	20(13)	●	●			·	•	·								·					●	•	·		
	4	11(3)	●		●	•			•													●				
	5	7(1)	●																						●	
	6	7(6)																				●				
	7	31(20)													●							●				
	8	6(3)	●																			●				
	9	17(13)	●																						●	
Arctic cisco	Keewatin (Fig. 12)																									
	7	19(19)																								
	11	2(2)																								
Least cisco	Victoria Island (Fig. 6)																									
	14	47(18)	●		●								●				•									
	15	10(1)	●								•	·	•				·	·		●			·		●	·
	22	1											●													
	27	2(1)	●																		●					
	King William Island (Fig. 9)																									
	6	60(8)	●			·						•	●	●			·			·	·		•		·	·
Lake whitefish	Keewatin (Fig. 12)																									
	7	58(57)													●											
Burbot	Keewatin (Fig. 12)																									
	7	3(2)																				●				
Greenland cod	Keewatin (Fig. 12)																									
	11	6(1)									●				●							●				
Fourhorn sculpin	Keewatin (Fig. 12)																									
	11	43(8)								●	●				●											
Shorthorn sculpin	Keewatin (Fig. 12)																									
	2	34(8)								·	●				•	●			●			·		·		·
Arctic staghorn sculpin	Keewatin (Fig. 12)																									
	2	6(4)																								●
Ribbed sculpin	Keewatin (Fig. 12)																									
	2	2(2)																								

footnotes on next page

Table 20. Cont'd.

[1] lab and/or field examinations, brackets indicate number with empty stomachs.

[2] miscellaneous includes:

Arctic charr	Ostracoda	Victoria Is., site 12
	detritus	Victoria Is., site 15
	insect	Victoria Is., site 23
Lake trout	bird feathers	Victoria Is., site 3,16
	beetle	Victoria Is., site 4
	pebbles	Victoria Is., site 6
	insect	Victoria Is., site 6
	crustacean	Victoria Is., site 6
Least cisco	Ostracoda	Victoria Is., site 15
	Ostracoda	King William Is., site 6
Shorthorn sculpin	kelp	Keewatin, site 2
	marine Pelecypoda	Keewatin, site 2
Arctic staghorn sculpin	kelp	Keewatin, site 2

contribution to diet ranked in order of importance from most important (●) to least important (·).

contribution based on dietary data presented in Tables 17 to 19.

Table 21. Metazoan parasites of fish caught in the 1982 study area (Fig. 1).

Species		Victoria Island (Fig. 6)																King William Island (Fig. 9)				Keewatin (Fig.12)								
Host	Parasite	3[1]	4	6	11	12	13	14	15	16	20	21	22	23	24	25	27	1	6	7	9	2	3	4	5	6	7	8	9	11
Arctic charr	Nematoda																													
	*Cystidicola cristivomeri White 1941								●	●	●	●		●			●	●		●	●		●							
	Cystidicola farionis Fischer 1798								●																		●			
	Philonema agubernaculum Simon & Simon 1936						●			●	●			●						●			●				●		●	●
	*Thynnascaris adunca (Rudolphi 1802) Hartwich 1957									●	●						●										●			●
	unidentified																	●												
	Cestoda																													
	Bothrimonus sturionis Duvernoy 1842										●	●		●					●								●			●
	Cyathocephalus truncatus (Pallas 1781)								●																					
	Diphyllobothrium dendriticum (Nitzsch 1824)[2]								●			●						●												
	Diphyllobothrium ditremum (Creplin 1825)[2]									●								●	●		●							●	●	
	Diphyllobothrium sp.[2]						●		●	●	●	●	●	●	●	●			●		●						●			
	Eubothrium salvelini (Schrank 1790) Nybelin 1922									●	●	●		●				●		●	●		●	●			●			
	Proteocephalus sp.									●		●			●	●														
	unidentified[3]																													
	Acanthocephala																													
	Echinorhynchus sp.									●	●			●				●									●			●
	Metechinorhynchus salmonis (O. F. Müller 1784) Petrochenko 1956								●		●																			
	unidentified[3]														●															
	Copepoda																													
	Salmincola carpionis (Krøyer 1837) Wilson 1915						●										●	●		●	●		●				●			
	Salmincola edwardsii (Olsson 1869) Wilson 1915[4]																●						●							
Lake trout	Nematoda																													
	Cystidicola cristivomeri White 1941		●		●	●			●	●		●	●	●		●	●	●									●			
	Philonema agubernaculum Simon & Simon 1936	●	●										●	●			●										●			
	Thynnascaris adunca (Rudolphi 1802) Hartwich 1957			●	●					●			●	●			●													
	Cestoda																													
	Bothrimonus sturionis Duvernoy 1842																										●			
	Diphyllobothrium dendriticum (Nitzsch 1824)				●								●													●				
	Diphyllobothrium ditremum (Creplin 1825)	●	●	●	●												●													
	Diphyllobothrium sp.	●	●	●		●			●	●		●	●	●			●	●					●	●	●	●	●	●	●	
	Eubothrium salvelini (Schrank 1790) Nybelin 1922	●	●		●	●				●				●			●	●					●	●			●		●	
	Proteocephalus arcticus Cooper 1921		●																											
	Proteocephalus sp.	●				●				●													●	●	●		●		●	
	unidentified[3]				●	●			●	●			●			●														
	Trematoda																													
	Crepidostomum farionis (O. F. Müller 1780) Lühe 1909		●																											

Table 21. Cont'd.

Species		Victoria Island (Fig. 6)																King William Island (Fig. 9)				Keewatin (Fig. 12)								
Host	Parasite	3[1]	4	6	11	12	13	14	15	16	20	21	22	23	24	25	27	1	6	7	9	2	3	4	5	6	7	8	9	11
Lake trout	Acanthocephala																													
	Echinorhynchus sp.		●							●			●	●			●	●									●			
	Metechinorhynchus salmonis (O. F. Müller 1784) Petrochenko 1956		●	●	●	●								●																
	unidentified[3]								●							●														
	Copepoda																													
	Salmincola edwardsii (Olsson 1869) Wilson 1915					●				●			●			●	●										●			
Arctic cisco	Cestoda																													
	Bothrimonus sturionis Duvernoy 1842																										●		●	
	Diphyllobothrium dendriticum (Nitzsch 1824)																										●		●	
	Diphyllobothrium ditremum (Creplin 1825)																										●			
	Proteocephalus sp.																												●	
	unidentified[3]																										●			
	Acanthocephala																													
	unidentified[3]																										●			
Least cisco	Cestoda																													
	Cyathocephalus truncatus (Pallas 1781)								●																					
	Diphyllobothrium dendriticum (Nitzsch 1824)								●																					
	Diphyllobothrium ditremum (Creplin 1825)							●	●										●											
	Diphyllobothrium sp.																●													
	Proteocephalus exiguus La Rue 1911							●											●											
	Trematoda																													
	Crepidostomum farionis (O. F. Müller 1780) Lühe 1909							●	●																					
	Acanthocephala																													
	Metechinorhynchus salmonis (O. F. Müller 1784) Petrochenko 1956							●	●																					
Lake Whitefish	Nematoda																													
	Cystidicola farionis Fischer 1798																										●			
	Cestoda																													
	Bothrimonus sturionis Duvernoy 1842																										●			
	Diphyllobothrium sp.																										●			
	unidentified[3]																										●			
	Acanthocephala																													
	Echinorhynchus sp.																										●			
	Copepoda																													
	Salmincola extumescens (Gadd 1901) Wilson 1915																										●			
	Coregonicola orientalis Markevich & Bauer 1950																										●			
Burbot	Copepoda																													
	Salmincola lotae (Olsson 1877) Wilson 1915																										●			
Greenland cod	Cestoda																													
	unidentified																													●
	Acanthocephala																													
	Echinorhynchus spp.																													●

Table 21. Cont'd

Species		Victoria Island (Fig. 6)																King William Island (Fig. 9)				Keewatin (Fig. 12)								
Host	Parasite	3[1]	4	6	11	12	13	14	15	16	20	21	22	23	24	25	27	1	6	7	9	2	3	4	5	6	7	8	9	11
Shorthorn sculpin	**Nematoda**																													
	Phocanema decipiens (Krabbe 1878) Myers 1959 (larva)																					●								
	Cestoda																													
	unidentified																					●								
	Hirudinoidea																													
	Malmiana brunnea (Johansson 1896) Strand 1942																					●								
	Platybdella olriki Malm 1865																					●								
Ribbed sculpin	**Cestoda**																													
	unidentified																					●								

[1] sample site

[2] plerocercoids

[3] parasites not collected for identification

● species present

*Note: Black (1983) has synonymized *Cystidicola cristivomer* with *C. stigmatura*.
Deardorff and Overstreet (1981) have resurrected the genus *Hysterothylacium* to replace the junior synonym *Thynnascaris*.

APPENDIX IV. GEOGRAPHIC DISTRIBUTIONS

- Crustacean zooplankton
- Mollusca
- Miscellaneous invertebrates

Table 22. Distribution of crustacean zooplankton in selected lakes in the 1982 study area (Fig. 1).

Species[1]	Victoria Island (Fig. 6)														King William Island (Fig. 9)				Keewatin (Fig. 12)				
	1[2]	3	4	6	8	11	12	13	14	15	17	23	27	28	1	6	7	9	4	5	9	10	12
Copepoda																							
Cyclops capillatus Sars 1863	●	●	●		●			●															
Cyclops magnus Marsh 1920															●								
Cyclops scutifer Sars 1863	●	●	●	●		●		●			●	●	●				●	●	●	●	●		●
Cyclops vernalis Fischer 1853					●																		
Cyclopidae							■		■							●							
Diaptomus arcticus Marsh 1920					●						●												
Diaptomus minutus Lilljeborg 1889																			●	●	●		
Diaptomus pribilofensis Juday & Muttkowski 1915				●	●																	●	●
Diaptomus sicilis Forbes 1882	●	●	●	●	●	●						●	●	●									
Diaptomidae							■	●	■	■													
Eurytemora canadensis Marsh 1920	●										●	●		●	●	●		●				●	●
Limnocalanus macrurus Sars 1863						●						●			●	●		●					
Cladocera																							
Alona costata Sars 1862					●																		
Alona quadrangularis (O. F. Müller 1785)					●																		
Bosmina longirostris (O. F. Müller 1785)	●	●			●										●		●		●			●	●
Chydorus sphaericus (O. F. Müller 1785)		●		●						■								●	●		●		
Daphnia longiremis Sars 1861		●	●	●				●					●						●	●	●		
Daphnia longispina microcephala Sars 1891																					●		
Daphnia middendorffiana Fischer 1851	●				●									●									
Daphnia pulex Leydig 1860 emend. Richard 1896	●		●								●												●
Daphnia pulex x *middendorffiana*	●					●											●						
Daphnia pulex x *schoedleri*					●																		
Daphnia rosea (?) Sars 1862 emend. Richard 1896		●																					
Daphnia schoedleri Sars 1862															●								
Daphnia sp.							◓		◓	■					◓	◓							
Eubosmina longispina (Leydig 1860)			●		●															●	●		
Eurycercus lamellatus (O. F. Müller 1785)			■				■			■		■											
Holopedium gibberum Zaddach 1855																			●	●	●		
Polyphemus pediculus (Linnaeus 1761)					●																		

[1] specimens identified by and housed in the collection of Dr. and Mrs. K. Patalas at the Freshwater Institute in Winnipeg.

[2] sample site

● species present

■ species found in fish stomachs

◓ ephippia found in fish stomachs

Table 23. Distribution of Mollusca collected in the 1982 study area (Fig. 1).

Species	Victoria Is. (Fig. 6)									King William Is. (Fig. 9)	Keewatin (Fig. 12)
	3[1]	4	6	7	13	15	22	23	27	6	2
Cl. Pelecypoda											
Sub Cl. Pteriomorphia											
C. Mytiloida											
F. Mytilidae											
Musculus niger (Gray 1824)											●[2]
Sub Cl. Heterodonta											
O. Veneroida											
F. Astartidae											
Astarte striata (Leach 1819)											●
F. Cardiidae											
Serripes groenlandicus (Bruguière 1789)											●
O. Eulamellibranchia[3]											
F. Sphaeriidae											
Sphaerium nitidum Clessin 1876			●			●	●				
Pisidium fallax Sterki 1890										●	
Pisidium lilljeborgi Clessin 1886			●				●				
Pisidium subtruncatum Malm 1855			●								
unidentified	●	●			●			●	●		
Cl. Gastropoda											
Sub Cl. Prosobranchia											
O. Archaeogastropoda											
F. Acmaeidae											
Notoacmea testudinalis (Müller 1776)											●
F. Lepetidae											
Lepeta caeca (Müller 1776)											●
F. Trochidae											
Margarites costalis (Gould 1841)											●
Margarites umbilicalis (Broderip and Sowerby 1829)											●
O. Neogastropoda											
F. Buccinidae											
Buccinum hydrophanum Hancock 1846											●
O. Mesogastropoda[3]											
F. Valvatidae											
Valvata sincera helicoidea Dall 1905		●				●					
F. Physidae											
Physa jennessi jennessi Dall 1919				●							

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[1] sample site.

[2] species present and specimens from each site deposited in the N.M.N.S.

[3] the order is represented by freshwater species.

Table 24. Distribution of miscellaneous invertebrates collected in the 1982 study area (Fig. 1).

Species	Victoria Island (Fig. 6)																				King William Island (Fig. 9)					Keewatin (Fig. 12)				
	2[1]	3	4	6	7	10	11	12	13	14	15	16	18	20	22	23	24	25	26	27	1	2	6	7	9	2	3	4	7	11
Phylum Arthropoda																														
Cl. Arachnida																														
O. Hydracarina		◒						◒		◒																				
F. Lebertiidae																														
Lebertia sp.			○								○																			
F. Unionicolidae																														
Huitfeldtia sp.																					○									
F. Acalyptonotidae																														
Acalyptonotus sp.											○																			
Cl. Crustacea																														
Sub Cl. Branchiopoda																														
O. Anostraca																														
F. Branchinectidae																														
Branchinecta paludosa (O.F. Müller 1777)					◒																	◒								
O. Notostraca																														
Lepidurus arcticus (Pallas 1793)	◒	●			◒				●			●				◒		●	◒		◒	◒	●							
Sub Cl. Ostracoda								◒			◒												◒							
Sub Cl. Malacostraca																														
O. Mysidacea																														
F. Mysidae																														
Mysis relicta Lovén 1862			●				●								●	●				●		●		●	●					
Mysis oculata (Fabricius 1780)																										◒				
O. Isopoda																														
F. Idotheidae																														
Mesidotea sp.																													●	●
O. Amphipoda												■		■				■			■									■
F. Gammaridae																														
Gammarus lacustris lacustris Sars 1864	◒			◒		◒	●				◒						◒													
Gammaracanthus loricatus (Sabine 1821)																●														
F. Lysianassidae																														
Onisimus plautus (Krøyer 1845)																										●[2]				
Cl. Insecta																														
O. Ephemeroptera													■																	
F. Baetidae																														
Baetis macani bundyae Lehmkuhl 1973					●																									
F. Siphlonuridae																														
Ameletus sp.																											●			
O. Plecoptera																											●			
F. Nemouridae												●																		
F. Perlodidae																														
Arcynopteryx compacta (McLachlan 1872)																											●			
O. Trichoptera									■			■						■		■			◒					■		
F. Limnephilidae																														
Apatania zonella Zetterstedt			◒																											
Grensia sp.		●		◒																	●									
Limnephilus pallens (Banks)			◒	◒				●																						
O. Diptera										◒																				
F. Simuliidae																														
Simulium sp.					●																									
F. Tipulidae																														
Tipula sp.												●															●			
O. Hymenoptera																														
F. Ichneumonidae																														
Glypta sp.				●																										
O. Collembola										◒																				
Phylum Echinodermata																														
Cl. Echinoidea																														
O. Centrechinoida																														
F. Strongylocentrotidae																														
Strongylocentrotus droebachiensis (O.F.Müller 1776)																										◒				
Cl. Asteroidea																														
O. Spinulosa																														
F. Solasteridae																														
Crossaster papposus (Linnaeus 1768)																										◒				
Cl. Ophiuroidea																										◒				

[1] Sample site.

[2] Subject to verification.

○ Specimens retained by Biosystematic Research Institute.

◒ Specimens sent to National Museum of Natural Sciences.

● Species present.

■ Invertebrate present but not kept for identification.

APPENDIX V. PREVIOUS NORTHERN LAND USE INFORMATION SERIES REPORTS

LAND USE INFORMATION SERIES REPORTS

Beaubier, P.H., and T. Pierce. 1974. Recreation-Tourism Evaluation, Land Use Information Series, Lands Directorate, Environment Canada, Ottawa.

Elson, M. 1974. Catalogue of Fish and Stream Resources of East Central Yukon Territory, Northern Operations Branch, Fisheries and Marine Service, Environment Canada.

Jacobson, R. 1979. Wildlife and Wildlife Habitat in the Great Slave and Great Bear Lake Regions 1974-1977, Environmental Studies No. 10, Northern Environmental Protection and Renewable Resources Branch, Department of Indian Affairs and Northern Development, Ottawa.

MacDonald, G., and R. Fudge. 1979. A Survey of the Fisheries Resources of the Kazan Upland (Southeastern District of Mackenzie, Southern District of Keewatin, N.W.T.) Environmental Studies No. 11, Northern Environmental Protection and Renewable Resources Branch, Department of Indian Affairs and Northern Development, Ottawa.

MacDonald, G., and D.B. Stewart. 1980. A Survey of the Aquatic Resources of the Central Keewatin Region of the Northwest Territories, Environmental Studies No. 17, Northern Environmental Protection and Renewable Resources Branch, Department of Indian Affairs and Northern Development, Ottawa.

Stewart, D.B., and L.M.J. Bernier. 1982. An Aquatic Resource Survey of the islands bordering Viscount Melville Sound, District of Franklin, Northwest Territories. Lands Directorate of Environment Canada and Northern Environment Directorate of Indian and Northern Affairs, Northern Land Use Series, Background Report #2.

Stewart, D.B., and G. MacDonald. 1978. A Survey of the Fisheries Resources of the Central Northwest Territories, Environmental Studies No. 8, Northern Environmental Protection Branch, Department of Indian Affairs and Northern Development and the Lands Directorate, Environment Canada, Ottawa.

Stewart, D.B., and G. MacDonald. 1981. An Aquatic Resource Survey of Devon, Cornwallis, Somerset and northern Baffin islands, District of Franklin, Northwest Territories, Environmental Studies No. 20, Northern Environmental Protection Branch, Department of Indian Affairs and Northern Development and the Lands Directorate, Environment Canada, Ottawa.

Sutherland, B.G., and W.R. Golke. 1978. A Summary of Fisheries Data Collected for the Land Use Map Series during 1975 and 1976, Environmental Studies No. 5, Northern Environmental Protection Branch, Department of Indian Affairs and Northern Development and the Lands Directorate, Environment Canada, Ottawa.

POOR

QUALITY

ORIGINAL